Quad Cities Nuclear Power Station

Technical Requirements Manual

(TRM)

Quad Cities Nuclear Power Station, Unit 1 and 2
Renewed Facility Operating License Nos. DPR-29 (Unit 1) and DPR-30 (Unit 2)
NRC Docket Nos. STN 50-254 (Unit 1) and 50-265 (Unit 2)

APPENDICES

BASES

BASES

1.0 USE AND APPLICATION

1.1 Definitions

---NOTE---
The defined terms of this section appear in capitalized type and are applicable throughout these Technical Requirements Manual and Bases.

Term	Definition
ACTIONS	ACTIONS shall be that part of a Requirement that prescribes Required Actions to be taken under designated Conditions within specified Completion Times.
CHANNEL CALIBRATION	A CHANNEL CALIBRATION shall be the adjustment, as necessary, of the channel output such that it responds within the necessary range and accuracy to known values of the parameter that the channel monitors. The CHANNEL CALIBRATION shall encompass all devices in the channel required for channel OPERABILITY and the CHANNEL FUNCTIONAL TEST. Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel. The CHANNEL CALIBRATION may be performed by means of any series of sequential, overlapping, or total channel steps.
CHANNEL CHECK	A CHANNEL CHECK shall be the qualitative assessment, by observation, of channel behavior during operation. This determination shall include, where possible, comparison of the channel indication and status to other indications or status derived from independent instrument channels measuring the same parameter.

(continued)

1.1 Definitions (continued)

CHANNEL FUNCTIONAL TEST	A CHANNEL FUNCTIONAL TEST shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify OPERABILITY of all devices in the channel required for channel OPERABILITY. The CHANNEL FUNCTIONAL TEST may be performed by means of any series of sequential, overlapping, or total channel steps.
CORE ALTERATION	CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. The following exceptions are not considered to be CORE ALTERATIONS: a. Movement of source range monitors, local power range monitors, intermediate range monitors, traversing incore probes, or special movable detectors (including undervessel replacement); and b. Control rod movement, provided there are no fuel assemblies in the associated core cell. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.
CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Technical Specification 5.6.5. Plant operation within these limits is addressed in individual requirements.
LOGIC SYSTEM FUNCTIONAL TEST	A LOGIC SYSTEM FUNCTIONAL TEST shall be a test of all logic components required for OPERABILITY of a logic circuit, from as close to the sensor as practicable up to, but not including, the actuated device, to verify OPERABILITY. The LOGIC SYSTEM

(continued)

LOGIC SYSTEM FUNCTIONAL TEST (continued)	FUNCTIONAL TEST may be performed by means of any series of sequential overlapping, or total system steps so that the entire logic system is tested.
MODE	A MODE shall correspond to any one inclusive combination of MODE switch position, average reactor coolant temperature, and reactor vessel head closure bolt tensioning specified in Technical Specifications Table 1.1-1 with fuel in the reactor vessel.
OFFSITE DOSE CALCULATION MANUAL (ODCM)	The ODCM shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring Alarm/Trip Setpoints, and in the conduct of the Environmental Radiological Monitoring Program. The ODCM shall also contain (1) the Radioactive Effluent Controls and Radiological Environmental Monitoring Programs and (2) descriptions of the information that should be included in the Annual Radiological Environmental Operating and Radioactive Effluent Release Reports.
OPERABLE - OPERABILITY	A system, subsystem, division, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, division, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of 2957 MWt.
THERMAL POWER	THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.

USE AND APPLICATION

1.2 Logical Connectors

PURPOSE

The purpose of this section is to explain the meaning of logical connectors.

Logical connectors are used in Technical Requirements Manual (TRM) to discriminate between, and yet connect, discrete Conditions, Required Actions, Completion Times, Surveillances, and Frequencies. The only logical connectors that appear in TRM are <u>AND</u> and <u>OR</u>. The physical arrangement of these connectors constitutes logical conventions with specific meanings.

BACKGROUND

Several levels of logic may be used to state Required Actions. These levels are identified by the placement (or nesting) of the logical connectors and by the number assigned to each Required Action. The first level of logic is identified by the first digit of the number assigned to a Required Action and the placement of the logical connector in the first level of nesting (i.e., left justified with the number of the Required Action). The successive levels of logic are identified by additional digits of the Required Action number and by successive indentions of the logical connectors.

When logical connectors are used to state a Condition, Completion Time, Surveillance, or Frequency, only the first level of logic is used, and the logical connector is left justified with the statement of the Condition, Completion Time, Surveillance, or Frequency.

EXAMPLES

The following examples illustrate the use of logical connectors.

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1.2 Logical Connectors

EXAMPLES (continued)

EXAMPLE 1.2-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. TLCO not met.	A.1 Verify . . . AND A.2 Restore . . .	

In this example, the logical connector AND is used to indicate that, when in Condition A, both Required Actions A.1 and A.2 must be completed.

(continued)

EXAMPLES (continued)

EXAMPLE 1.2-2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. TLCO not met.	A.1 Trip . . . OR A.2.1 Verify . . . AND A.2.2.1 Reduce . . . OR A.2.2.2 Perform . . . OR A.3 Align . . .	

This example represents a more complicated use of logical connectors. Required Actions A.1, A.2, and A.3 are alternative choices, only one of which must be performed as indicated by the use of the logical connector OR and the left justified placement. Any one of these three Actions may be chosen. If A.2 is chosen, then both A.2.1 and A.2.2 must be performed as indicated by the logical connector AND. Required Action A.2.2 is met by performing A.2.2.1 or A.2.2.2. The indented position of the logical connector OR indicates that A.2.2.1 and A.2.2.2 are alternative choices, only one of which must be performed.

1.0 USE AND APPLICATION

1.3 Completion Times

PURPOSE

The purpose of this section is to establish the Completion Time convention and to provide guidance for its use.

BACKGROUND

Technical Requirements Manual Limiting Conditions for Operation (TLCOs) specify minimum requirements for ensuring safe operation of the unit. The ACTIONS associated with a TLCO state Conditions that typically describe the ways in which the requirements of the TLCO can fail to be met. Specified with each stated Condition are Required Action(s) and Completion Time(s).

DESCRIPTION

The Completion Time is the amount of time allowed for completing a Required Action. It is referenced to the discovery of a situation (e.g., inoperable equipment or variable not within limits) that requires entering an ACTIONS Condition unless otherwise specified, providing the unit is in a MODE or specified condition stated in the Applicability of the TLCO. Unless otherwise specified, the Completion Time begins when a senior licensed operator on the operating shift crew with responsibility for plant operations makes the determination that an LCO is not met and an ACTIONS Condition is entered. The “otherwise specified” exceptions are varied, such as a Required Action Note or Surveillance Requirement Note that provides an alternative time to perform specific tasks, such as testing, without starting the Completion Time. While utilizing the Note, should a Condition be applicable for any reason not addressed by the Note, the Completion Time begins. Should the time allowance in the Note be exceeded, the Completion Time begins at that point. The exceptions may also be incorporated into the Completion Time. For example, LCO 3.8.1, “AC Sources – Operating,” Required Action B.2, requires declaring required feature(s) supported by an inoperable diesel generator, inoperable when the redundant required feature(s) are inoperable. The Completion Time states, “4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s).” In this case the Completion Time does not begin until the conditions in the Completion Time are satisfied. Required Actions must be completed prior to the expiration of the specified Completion Time. An ACTIONS Condition remains in effect and the Required Actions apply until the Condition no longer exists or the unit is not within the TLCO Applicability.

(continued)

DESCRIPTION (continued)

If situations are discovered that require entry into more than one Condition at a time within a single TLCO (multiple Conditions), the Required Actions for each Condition must be performed within the associated Completion Time. When in multiple Conditions, separate Completion Times are tracked for each Condition starting from the discovery of the situation that required entry into the Condition, unless otherwise specified.

Once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition unless specifically stated. The Required Actions of the Condition continue to apply to each additional failure, with Completion Times based on initial entry into the Condition, unless otherwise specified.

However, when a subsequent division, subsystem, component, or variable expressed in the Condition is discovered to be inoperable or not within limits, the Completion Time(s) may be extended. To apply this Completion Time extension, two criteria must first be met. The subsequent inoperability:

a. Must exist concurrent with the first inoperability; and

b. Must remain inoperable or not within limits after the first inoperability is resolved.

The total Completion Time allowed for completing a Required Action to address the subsequent inoperability shall be limited to the more restrictive of either:

a. The stated Completion Time, as measured from the initial entry into the Condition, plus an additional 24 hours; or

b. The stated Completion Time as measured from discovery of the subsequent inoperability.

The above Completion Time extension does not apply to those TLCOs that have exceptions that allow completely separate re-entry into the Condition (for each division, subsystem, component, or variable expressed in the Condition) and separate tracking of Completion Times based on this re-entry. These exceptions are stated in individual TLCOs.

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DESCRIPTION (continued)

The above Completion Time extension does not apply to a Completion Time with a modified "time zero." This modified "time zero" may be expressed as a repetitive time (i.e., "once per 8 hours," where the Completion Time is referenced from a previous completion of the Required Action versus the time of Condition entry) or as a time modified by the phrase "from discovery . . ." Example 1.3-3 illustrates one use of this type of Completion Time. The 10 day Completion Time specified for Conditions A and B in Example 1.3-3 may not be extended.

EXAMPLES

The following examples illustrate the use of Completion Times with different types of Conditions and changing Conditions.

EXAMPLE 1.3-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	12 hours 36 hours

Condition B has two Required Actions. Each Required Action has its own separate Completion Time. Each Completion Time is referenced to the time that Condition B is entered.

The Required Actions of Condition B are to be in MODE 3 within 12 hours AND in MODE 4 within 36 hours. A total of 12 hours is allowed for reaching MODE 3 and a total of 36 hours (not 48 hours) is allowed for reaching MODE 4 from the time that Condition B was entered. If MODE 3 is reached within 6 hours, the time allowed for reaching MODE 4 is the next 30 hours because the total time allowed for reaching MODE 4 is 36 hours.

If Condition B is entered while in MODE 3, the time allowed for reaching MODE 4 is the next 36 hours.

(continued)

EXAMPLES (continued)

EXAMPLE 1.3-2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One pump inoperable.	A.1 Restore pump to OPERABLE status.	7 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	12 hours 36 hours

When a pump is declared inoperable, Condition A is entered. If the pump is not restored to OPERABLE status within 7 days, Condition B is also entered and the Completion Time clocks for Required Actions B.1 and B.2 start. If the inoperable pump is restored to OPERABLE status after Condition B is entered, Condition A and B are exited, and therefore, the Required Actions of Condition B may be terminated.

When a second pump is declared inoperable while the first pump is still inoperable, Condition A is not re-entered for the second pump. TLCO 3.0.c is entered, since the ACTIONS do not include a Condition for more than one inoperable pump. The Completion Time clock for Condition A does not stop after TLCO 3.0.c is entered, but continues to be tracked from the time Condition A was initially entered.

While in TLCO 3.0.c, if one of the inoperable pumps is restored to OPERABLE status and the Completion Time for Condition A has not expired, TLCO 3.0.c may be exited and operation continued in accordance with Condition A.

(continued)

1.3 Completion Times

EXAMPLES

EXAMPLE 1.3-2 (continued)

While in TLCO 3.0.c, if one of the inoperable pumps is restored to OPERABLE status and the Completion Time for Condition A has expired, TLCO 3.0.c may be exited and operation continued in accordance with Condition B. The Completion Time for Condition B is tracked from the time the Condition A Completion Time expired.

On restoring one of the pumps to OPERABLE status, the Condition A Completion Time is not reset, but continues from the time the first pump was declared inoperable. This Completion Time may be extended if the pump restored to OPERABLE status was the first inoperable pump. A 24 hour extension to the stated 7 days is allowed, provided this does not result in the second pump being inoperable for > 7 days.

(continued)

EXAMPLES (continued)

EXAMPLE 1.3-3

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Function X subsystem inoperable.	A.1 Restore Function X subsystem to OPERABLE status.	7 days AND 10 days from discovery of failure to meet the TLCO
B. One Function Y subsystem inoperable.	B.1 Restore Function Y subsystem to OPERABLE status.	72 hours AND 10 days from discovery of failure to meet the TLCO
C. One Function X subsystem inoperable. AND One Function Y subsystem inoperable.	C.1 Restore Function X subsystem to OPERABLE status. OR C.2 Restore Function Y subsystem to OPERABLE status.	72 hours 72 hours

(continued)

EXAMPLES

EXAMPLE 1.3-3 (continued)

When one Function X subsystem and one Function Y subsystem are inoperable, Condition A and Condition B are concurrently applicable. The Completion Times for Condition A and Condition B are tracked separately for each subsystem, starting from the time each subsystem was declared inoperable and the Condition was entered. A separate Completion Time is established for Condition C and tracked from the time the second subsystem was declared inoperable (i.e., the time the situation described in Condition C was discovered).

If Required Action C.2 is completed within the specified Completion Time, Conditions B and C are exited. If the Completion Time for Required Action A.1 has not expired, operation may continue in accordance with Condition A. The remaining Completion Time in Condition A is measured from the time the affected subsystem was declared inoperable (i.e., initial entry into Condition A).

The Completion Times of Conditions A and B are modified by a logical connector, with a separate 10 day Completion Time measured from the time it was discovered the TLCO was not met. In this example, without the separate Completion Time, it would be possible to alternate between Conditions A, B, and C in such a manner that operation could continue indefinitely without ever restoring systems to meet the TLCO. The separate Completion Time modified by the phrase "from discovery of failure to meet the TLCO" is designed to prevent indefinite continued operation while not meeting the TLCO. This Completion Time allows for an exception to the normal "time zero" for beginning the Completion Time "clock". In this instance, the Completion Time "time zero" is specified as commencing at the time the TLCO was initially not met, instead of at the time the associated Condition was entered.

(continued)

EXAMPLES (continued)

EXAMPLE 1.3-4

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more valves inoperable.	A.1 Restore valve(s) to OPERABLE status.	4 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	12 hours 36 hours

A single Completion Time is used for any number of valves inoperable at the same time. The Completion Time associated with Condition A is based on the initial entry into Condition A and is not tracked on a per valve basis. Declaring subsequent valves inoperable, while Condition A is still in effect, does not trigger the tracking of separate Completion Times.

Once one of the valves has been restored to OPERABLE status, the Condition A Completion Time is not reset, but continues from the time the first valve was declared inoperable. The Completion Time may be extended if the valve restored to OPERABLE status was the first inoperable valve. The Condition A Completion Time may be extended for up to 4 hours provided this does not result in any subsequent valve being inoperable for > 4 hours.

If the Completion Time of 4 hours (plus the extension) expires while one or more valves are still inoperable, Condition B is entered.

(continued)

EXAMPLES (continued)

EXAMPLE 1.3-5

ACTIONS

--NOTE--
Separate Condition entry is allowed for each inoperable valve.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more valves inoperable.	A.1 Restore valve to OPERABLE status.	4 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. <u>AND</u> B.2 Be in MODE 4.	12 hours 36 hours

The Note above the ACTIONS Table is a method of modifying how the Completion Time is tracked. If this method of modifying how the Completion Time is tracked was applicable only to a specific Condition, the Note would appear in that Condition rather than at the top of the ACTIONS Table.

The Note allows Condition A to be entered separately for each inoperable valve, and Completion Times tracked on a per valve basis. When a valve is declared inoperable, Condition A is entered and its Completion Time starts. If subsequent valves are declared inoperable, Condition A is entered for each valve and separate Completion Times start and are tracked for each valve.

(continued)

EXAMPLES

EXAMPLE 1.3-5 (continued)

If the Completion Time associated with a valve in Condition A expires, Condition B is entered for that valve. If the Completion Times associated with subsequent valves in Condition A expire, Condition B is entered separately for each valve and separate Completion Times start and are tracked for each valve. If a valve that caused entry into Condition B is restored to OPERABLE status, Condition B is exited for that valve.

Since the Note in this example allows multiple Condition entry and tracking of separate Completion Times, Completion Time extensions do not apply.

EXAMPLE 1.3-6

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One channel inoperable.	A.1 Perform TSR 3.x.x.x. OR A.2 Reduce THERMAL POWER to ≤ 50% RTP.	Once per 8 hours 8 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	12 hours

(continued)

EXAMPLES

EXAMPLE 1.3-6 (continued)

Entry into Condition A offers a choice between Required Action A.1 or A.2. Required Action A.1 has a "once per" Completion Time, which qualifies for the 25% extension, per TSR 3.0.b, to each performance after the initial performance. The initial 8 hour interval of Required Action A.1 begins when Condition A is entered and the initial performance of Required Action A.1 must be completed within the first 8 hour interval. If Required Action A.1 is followed and the Required Action is not met within the Completion Time (plus the extension allowed by TSR 3.0.b), Condition B is entered. If Required Action A.2 is followed and the Completion Time of 8 hours is not met, Condition B is entered.

If after entry into Condition B, Required Action A.1 or A.2 is met, Condition B is exited and operation may then continue in Condition A.

(continued)

EXAMPLES (continued)

EXAMPLE 1.3-7

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One subsystem inoperable.	A.1 Verify affected subsystem isolated. AND A.2 Restore subsystem to OPERABLE status.	1 hour AND Once per 8 hours thereafter 72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	12 hours 36 hours

Required Action A.1 has two Completion Times. The 1 hour Completion Time begins at the time the Condition is entered and each "Once per 8 hours thereafter" interval begins upon performance of Required Action A.1.

If after Condition A is entered, Required Action A.1 is not met within either the initial 1 hour or any subsequent 8 hour interval from the previous performance (plus the extension allowed by TSR 3.0.b), Condition B is entered. The Completion Time clock for Condition A does not stop after Condition B is entered, but continues from the time Condition A was initially entered. If Required Action A.1

(continued)

EXAMPLES	EXAMPLE 1.3-7 (continued) is met after Condition B is entered, Condition B is exited and operation may continue in accordance with Condition A, provided the Completion Time for Required Action A.2 has not expired.
IMMEDIATE COMPLETION TIME	When "Immediately" is used as a Completion Time, the Required Action should be pursued without delay and in a controlled manner.

1.0 USE AND APPLICATION

1.4 Frequency

PURPOSE

The purpose of this section is to define the proper use and application of Frequency requirements.

DESCRIPTION

Each Technical Requirements Manual Surveillance Requirement (TSR) has a specified Frequency in which the Surveillance must be met in order to meet the associated Technical Requirements Manual Limiting Condition for Operation (TLCO). An understanding of the correct application of the specified Frequency is necessary for compliance with the TSR.

The "specified Frequency" is referred to throughout this section and each of the Specifications of Section 3.0, Technical Requirements Manual Surveillance Requirement (TSR) Applicability. The "specified Frequency" consists of the requirements of the Frequency column of each TSR, as well as certain Notes in the Surveillance column that modify performance requirements.

Sometimes special situations dictate when the requirements of a Surveillance are to be met. They are "otherwise stated" conditions allowed by TSR 3.0.a. They may be stated as clarifying Notes in the Surveillance, as part of the Surveillance, or both. Example 1.4-4 discusses these special situations.

Situations where a Surveillance could be required (i.e., its Frequency could expire), but where it is not possible or not desired that it be performed until sometime after the associated TLCO is within its Applicability, represent potential TSR 3.0.d conflicts. To avoid these conflicts, the TSR (i.e., the Surveillance or the Frequency) is stated such that it is only "required" when it can be and should be performed. With an TSR satisfied, TSR 3.0.d imposes no restriction.

The use of "met" or "performed" in these instances conveys specified meanings. A Surveillance is "met" only when the acceptance criteria are satisfied. Known failure of the requirements of a Surveillance, even without a Surveillance specifically being "performed," constitutes a Surveillance not "met." "Performance" refers only to the requirement to

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DESCRIPTION (continued)

specifically determine the ability to meet the acceptance criteria. TSR 3.0.d restrictions would not apply if both the following conditions are satisfied:

a. The Surveillance is not required to be performed; and

b. The Surveillance is not required to be met or, even if required to be met, is not known to be failed.

EXAMPLES

The following examples illustrate the various ways that Frequencies are specified. In these examples, the Applicability of the TLCO (TLCO not shown) is MODES 1, 2, and 3.

EXAMPLE 1.4-1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Perform CHANNEL CHECK.	12 hours

Example 1.4-1 contains the type of TSR most often encountered in the Technical Requirements Manual (TRM). The Frequency specifies an interval (12 hours) during which the associated Surveillance must be performed at least one time. Performance of the Surveillance initiates the subsequent interval. Although the Frequency is stated as 12 hours, an extension of the time interval to 1.25 times the interval specified in the Frequency is allowed by TSR 3.0.b for operational flexibility. The measurement of this interval continues at all times, even when the TSR is not required to be met per TSR 3.0.a (such as when the equipment is inoperable, a variable is outside specified limits, or the unit is outside the Applicability of the TLCO). If the interval specified by TSR 3.0.b is exceeded while the unit is in a MODE or other specified condition in the

(continued)

EXAMPLES

EXAMPLE 1.4-1 (continued)

Applicability of the TLCO, and the performance of the Surveillance is not otherwise modified (refer to Examples 1.4-3 and 1.4-4), then TSR 3.0.c becomes applicable.

If the interval as specified by TSR 3.0.b is exceeded while the unit is not in a MODE or other specified condition in the Applicability of the TLCO for which performance of the TSR is required, the Surveillance must be performed within the Frequency requirements of TSR 3.0.b prior to entry into the MODE or other specified condition. Failure to do so would result in a violation of TSR 3.0.d.

EXAMPLE 1.4-2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Verify flow is within limits.	Once within 12 hours after $\geq$ 25% RTP AND 24 hours thereafter

Example 1.4-2 has two Frequencies. The first is a one time performance Frequency, and the second is of the type shown in Example 1.4-1. The logical connector "AND" indicates that both Frequency requirements must be met. Each time reactor power is increased from a power level < 25% RTP to $\geq$ 25% RTP, the Surveillance must be performed within 12 hours.

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EXAMPLES

EXAMPLE 1.4-2 (continued)

The use of "once" indicates a single performance will satisfy the specified Frequency (assuming no other Frequencies are connected by "AND"). This type of Frequency does not qualify for the extension allowed by TSR 3.0.b.

"Thereafter" indicates future performances must be established per TSR 3.0.b, but only after a specified condition is first met (i.e., the "once" performance in this example). If reactor power decreases to < 25% RTP, the measurement of both intervals stops. New intervals start upon reactor power reaching 25% RTP.

EXAMPLE 1.4-3

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
--------------------------NOTE---------------------------- Not required to be performed until 12 hours after ≥ 25% RTP. -- Perform channel adjustment.	7 days

The interval continues whether or not the unit operation is < 25% RTP between performances.

As the Note modifies the required performance of the Surveillance, it is construed to be part of the "specified Frequency." Should the 7 day interval be exceeded while operation is < 25% RTP, this Note allows 12 hours after power reaches ≥ 25% RTP to perform the Surveillance. The Surveillance is still considered to be within the "specified Frequency." Therefore, if the Surveillance were not performed within the 7 day interval (plus the extension

(continued)

EXAMPLES

EXAMPLE 1.4-3 (continued)

allowed by TSR 3.0.b), but operation was < 25% RTP, it would not constitute a failure of the TSR or failure to meet the TLCO. Also, no violation of TSR 3.0.d occurs when changing MODES, even with the 7 day Frequency not met, provided operation does not exceed 12 hours with power $\geq$ 25% RTP.

Once the unit reaches 25% RTP, 12 hours would be allowed for completing the Surveillance. If the Surveillance were not performed within this 12 hour interval, there would then be a failure to perform a Surveillance within the specified Frequency, and the provisions of TSR 3.0.c would apply.

EXAMPLE 1.4-4

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
--------------------------NOTE---------------------------- Only required to be met in MODE 1. --- Verify leakage rates are within limits.	24 hours

Example 1.4-4 specifies that the requirements of this Surveillance do not have to be met until the unit is in MODE 1. The interval measurement for the Frequency of this Surveillance continues at all times, as described in Example 1.4-1. However, the Note constitutes an "otherwise stated" exception to the Applicability of this Surveillance. Therefore, if the Surveillance were not performed within the 24 hour interval (plus the extension allowed by TSR 3.0.b), but the unit was not in MODE 1, there would be no failure of the TSR nor failure to meet the TLCO. Therefore, no violation of TSR 3.0.d occurs when changing MODES, even with the 24 hour Frequency exceeded, provided the MODE change was not made into MODE 1. Prior to entering MODE 1 (assuming again that the 24 hour Frequency were not met), TSR 3.0.d would require satisfying the TSR.

1.0 USE AND APPLICATION

1.5 TLCO and TSR Implementation

The Technical Requirements Manual (TRM) provides those limitations upon plant operations which are part of the licensing basis for the station but do not meet the criteria for continued inclusion in the Technical Specifications.

It also provides information which supplements the Technical Specifications. Nothing in the TRM shall supersede any Technical Specification requirement.

TLCOs and TSRs are implemented the same as Technical Specifications (see TRM 3.0). However, TLCOs and TSRs are treated as plant procedures and are not part of the Technical Specifications. Therefore the following exceptions apply:

a. Violations of the Action or Surveillance requirements in a TLCO are not reportable as conditions prohibited by, or deviations from, the Technical Specifications per 10 CFR 50.72 or 10 CFR 50.73, unless specifically required by the TRM.

b. Power reduction or plant shutdowns required to comply with the Actions of a TLCO or as a result of the application of TLCO 3.0.c are not reportable per 10 CFR 50.72 or 10 CFR 50.73.

c. Violations of TLCO or TSR requirements, except as provided for in TLCO 3.0 of this manual, shall be treated the same as plant procedure violations.

1.0 USE AND APPLICATION

1.6 Technical Requirements Manual Revisions

Changes to this manual shall be made under the following provisions:

a. Changes to the TRM shall be made under appropriate administrative controls and reviews.

b. Licensees may make changes to TRM without prior NRC approval provided the change does not require NRC approval pursuant to 10 CFR 50.59.

c. The TRM revision process shall contain provisions to ensure that the TRM is maintained consistent with the UFSAR.

d. Proposed changes that require NRC approval prior to shall be reviewed and approved by the NRC prior to implementation. Changes to the TRM implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e) as modified by approved exemptions.

2.1.a MISCELLANEOUS TEST REQUIREMENTS

---NOTE---
Failure to meet the surveillance requirement require immediate actions to determine OPERABILITY of the associated equipment.

APPLICABILITY: As defined in the TSR.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 2.1.a.1	------------------------------NOTE--------------------------- Only applicable in MODES 1 and 2. --- Verify reactor recirculation control system programmed maximum speed limit setting and adjustable speed drive programmed maximum speed limit setting are within the limits specified by the COLR.	24 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
TSR 2.1.a.2	---------------------------NOTE------------------------------ TSR 2.1.a.2 provides the scram time limits for <800 psig steam dome pressure to satisfy Technical Specification SR 3.1.4.3 and is only applicable in MODES 1 and 2. --- Verify each affected control rod scram time is within limits of Technical Specification Table 3.1.4-1 with any reactor pressure. The control rod scram time acceptance criteria shall be $\leq$ 2.04 seconds from fully withdrawn position to 90% insertion at 0 psig reactor steam dome pressure.	Prior to declaring control rod OPERABLE after work on the control rod or CRD System that could affect scram time
TSR 2.1.a.3	----------------------------NOTE----------------------------- Only applicable when associated diesel generator is required to be OPERABLE. --- Drain each diesel generator fuel oil storage tank, remove the accumulated sediment, and clean the tank.	10 years

3.0 TECHNICAL REQUIREMENTS MANUAL LIMITING CONDITION FOR OPERATION (TLCO) APPLICABILITY

TLCO 3.0.a — TLCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in TLCO 3.0.b.

TLCO 3.0.b — Upon discovery of a failure to meet a TLCO, the Required Actions of the associated Conditions shall be met, except as provided in TLCO 3.0.e.

If the TLCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required, unless otherwise stated.

TLCO 3.0.c — When a TLCO is not met and the associated ACTIONS are not met, an associated ACTION is not provided, or if directed by the associated ACTIONS, action shall be initiated within 1 hour to:

a. Implement appropriate compensatory actions as needed;

b. Verify that the plant is not in an unanalyzed condition(s) or that a required safety function is not compromised by the inoperabilities; and

c. Within 12 hours, obtain Station Duty Officer approval of the compensatory actions and the plan for exiting TLCO 3.0.c.

Exceptions to this TLCO are stated in the individual TLCOs.

Where corrective measures are completed that permit operation in accordance with the TLCO or ACTIONS, completion of the actions required by TLCO 3.0.c is not required.

TLCO 3.0.c is only applicable in MODES 1, 2, and 3.

TLCO 3.0.d — When an TLCO is not met, entry into a MODE or other specified condition in the Applicability shall only be made:

1. When the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time;

(continued)

3.0 TLCO APPLICABILITY (continued)

TLCO 3.0.d (continued)	2. After performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the MODE or other specified condition in the Applicability, and establishment of risk management actions, if appropriate (exceptions to this TLCO are stated in the individual TLCOs); or 3. When an allowance is stated in the individual value, parameter, or other TLCO. This TLCO shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.
TLCO 3.0.e	Equipment removed from service or declared inoperable to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to TLCO 3.0.b for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.
TLCO 3.0.f	TLCOs, including associated ACTIONS, shall apply to each unit individually, unless otherwise indicated. Whenever the TLCO refers to a system or component that is shared by both units, the ACTIONS will apply to both units simultaneously.

3.0 TECHNICAL REQUIREMENTS MANUAL SURVEILLANCE REQUIREMENT (TSR) APPLICABILITY

TSR 3.0.a

TSRs shall be met during the MODES or other specified conditions in the Applicability for individual TLCOs, unless otherwise stated in the TSR. Failure to meet a TSR, whether such failure is experienced during the performance of the TSR or between performances of the TSR, shall be failure to meet the TLCO. Failure to perform a TSR within the specified Frequency shall be failure to meet the TLCO except as provided in TSR 3.0.c. TSRs do not have to be performed on inoperable equipment or variables outside specified limits.

TSR 3.0.b

The specified Frequency for each TSR is met if the TSR is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met.

For Frequencies specified as "once," the above interval extension does not apply.

If a Completion Time requires periodic performance on a "once per . . ." basis, the above Frequency extension applies to each performance after the initial performance.

Exceptions to this TSR are stated in the individual TSRs.

TSR 3.0.c

If it is discovered that a TSR was not performed within its specified Frequency, then compliance with the requirement to declare the TLCO not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Frequency, whichever is greater. This delay period is permitted to allow performance of the TSR. The delay period is only applicable when there is a reasonable expectation the surveillance will be met when performed. A risk evaluation shall be performed for any Surveillance delayed greater than 24 hours and the risk impact shall be managed.

If the TSR is not performed within the delay period, the TLCO must immediately be declared not met, and the applicable Condition(s) must be entered.

When the TSR is performed within the delay period and the TSR is not met, the TLCO must immediately be declared not met, and the applicable Condition(s) must be entered.

(continued)

3.0 TSR APPLICABILITY (continued)

TSR 3.0.d	Entry into a MODE or other specified condition in the Applicability of an TLCO shall only be made when the TLCO's TSRs have been met within their specified Frequency, except as provided by TSR 3.0.c. When an TLCO is not met due to TSRs not having been met, entry into a MODE or other specified condition in the Applicability shall only be made in accordance with TLCO 3.0.d. This provision shall not prevent entry into MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.
TSR 3.0.e	TSRs shall apply to each unit individually, unless otherwise indicated.

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Technical Requirements Manual Section 3.1 Not Used

3.3 INSTRUMENTATION

3.3.a Control Rod Block Instrumentation

TLCO 3.3.a The control rod block instrumentation for each Function in Table T3.3.a-1 shall be OPERABLE.

APPLICABILITY: According to Table T3.3.a-1.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. For Functions 1.a, 1.b, 1.c, 1.d, 2.a, 2.b, 2.c, 3.a, 3.b, 3.c, and 3.d, one required channel inoperable.	A.1 Restore inoperable channel to OPERABLE status.	7 days
B. For Functions 4.a and 4.b, one or more required channels inoperable.	B.1 Place inoperable channels in trip.	12 hours

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. For Functions 1.a, 1.b, 1.c, 1.d, 2.a, 2.b, 2.c, 3.a, 3.b, 3.c, and 3.d, two or more required channels inoperable. <u>OR</u> Required Action and associated Completion Time of Condition A not met.	C.1 Place inoperable channels in trip.	1 hour

SURVEILLANCE REQUIREMENTS

--NOTES--
1. Refer to Table T3.3.a-1 to determine which TSRs apply to each Control Rod Block Function.

2. When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains Control Rod Block capability.

SURVEILLANCE		FREQUENCY
TSR 3.3.a.1	------------------------------NOTE------------------------------ Not required to be performed when entering MODE 2 from MODE 1 until 12 hours after entering MODE 2. --- Perform CHANNEL FUNCTIONAL TEST.	7 days
TSR 3.3.a.2	----------------------------NOTE------------------------------ For Function 1.d, not required to be performed when entering MODE 2 from MODE 1 until 12 hours after entering MODE 2 --- Perform CHANNEL FUNCTIONAL TEST.	92 days
TSR 3.3.a.3	------------------------------NOTES---------------------------- 1. For Function 1.d, not required to be performed when entering MODE 2 from MODE 1 until 12 hours after entering MODE 2. 2. Neutron detectors are excluded. 3. For Function 1.a, not required for the flow portion of the channels. --- Perform CHANNEL CALIBRATION.	184 days

(continued)

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
TSR 3.3.a.4	-----------------------------NOTE----------------------------- 1. Not required to be performed when entering MODE 2 from MODE 1 until 12 hours after entering MODE 2. 2. Neutron detectors are excluded. -- Perform CHANNEL CALIBRATION.	 18 months
TSR 3.3.a.5	Perform CHANNEL FUNCTIONAL TEST.	24 months
TSR 3.3.a.6	-----------------------------NOTE----------------------------- 1. Not required to be performed when entering MODE 2 from MODE 1 until 12 hours after entering MODE 2. 2. Neutron detectors are excluded. -- Perform CHANNEL CALIBRATION.	 24 months

Table T3.3.a-1 (page 1 of 2)
Control Rod Block Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Average Power Range Monitors				
a. Flow Biased Neutron Flux — High	1	4	TSR 3.3.a.2 TSR 3.3.a.3	≤ 0.56W + 55.4%[(a)] RTP and ≤ 109.9% RTP
b. Inoperative	1, 2, 5[(e)]	4	TSR 3.3.a.2	N.A.
c. Downscale	1	4	TSR 3.3.a.2 TSR 3.3.a.3	≥ 3.5 % RTP
d. Neutron Flux — High, Setdown	2,5[(e)]	4	TSR 3.3.a.2 TSR 3.3.a.3	≤ 14.1 % RTP
2. Source Range Monitors				
a. Detector not full in	2[(b)(d)]	3	TSR 3.3.a.1 TSR 3.3.a.6	N.A.
	5[(d)(h)]	2	TSR 3.3.a.1 TSR 3.3.a.6	N.A.
b. Upscale	2[(c)]	3	TSR 3.3.a.1 TSR 3.3.a.4	≤ 2.8 x 10^5 cps
	5[(h)]	2	TSR 3.3.a.1 TSR 3.3.a.4	≤2.8 x 10^5 cps
c. Inoperative	2[(c)]	3	TSR 3.3.a.1	N.A.
	5[(h)]	2	TSR 3.3.a.1	N.A.

(continued)

(a) Allowable Value is ≤ 0.56W + 51.2% RTP and ≤ 109.9% RTP when reset for single loop operation per Technical Specification 3.4.1, "Recirculation Loops Operating."

(b) With the Intermediate Range Monitor (IRM) channels are on range 2 or below.

(c) With IRM channels on range 7 or below.

(d) With detector count rate less than or equal to the Allowable Value (Detector Not Full In AV ≥ 163 cps).

(e) Required to be OPERABLE only during SHUTDOWN MARGIN demonstrations performed per Specification 3.10.7.

Table T3.3.a-1 (page 2 of 2)
Control Rod Block Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
3. Intermediate Range Monitors				
a. Detector not full in	2, 5(h)	6	TSR 3.3.a.1 TSR 3.3.a.6	N.A.
b. Upscale	2, 5(h)	6	TSR 3.3.a.1 TSR 3.3.a.6	≤ 112/125 of full scale
c. Inoperative	2, 5(h)	6	TSR 3.3.a.1	N.A.
d. Downscale(f)	2, 5(h)	6	TSR 3.3.a.1 TSR 3.3.a.6	≥ 5/125 of full scale
4. Scram Discharge Volume				
a. Water Level — High	1, 2, 5(g)	1 per bank	TSR 3.3.a.2	≤ 25.5 gal
b. Scram Discharge Volume Switch in Bypass	5(g)	1	TSR 3.3.a.5	N.A.

(f) With IRM channels on range 2 or higher.

(g) With two or more control rods withdrawn. Not applicable to control rods removed per Technical Specification 3.10.4, "Single Control Rod Drive Removed — Refueling", or 3.10.5, "Multiple Control Rod Withdrawal — Refueling."

(h) With any control rod withdrawn from a core cell containing one or more fuel assemblies.

3.3 INSTRUMENTATION

3.3.b Post Accident Monitoring (PAM) Instrumentation

TLCO 3.3.b The PAM instrumentation for each Function in Table T3.3.b-1 shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

------------------------------------NOTE------------------------------------
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one required channel inoperable.	A.1 Restore required channel to OPERABLE status.	30 days
B. One or more Functions with two required channels inoperable.	B.1 Restore one required channel to OPERABLE status.	7 days
-------------- NOTE -------------- Functions 1, 2, 3, and 4 only. ------------------------------------- C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Initiate alternate method of monitoring the appropriate parameters. <u>AND</u> C.2 Prepare a corrective action program report.	Immediately Immediately

ACTIONS

--------------- NOTE --------------- Functions 5 and 6 only. --		
D. Required Action and associated Completion Time of Condition A or B not met.	D.1 Prepare a corrective action program report. <u>AND</u> D.2 Initiate alternate method of monitoring the appropriate parameters. <u>OR</u> D.3 Enter TLCO 3.0.c	Immediately Immediately

SURVEILLANCE REQUIREMENTS

--NOTE--

1. These TSRs apply to each Function in Table T3.3.b-1, except where identified in the TSR.

2. When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the other required channel in the associated Function is OPERABLE.

SURVEILLANCE		FREQUENCY
TSR 3.3.b.1	Perform CHANNEL CHECK.	31 days
TSR 3.3.b.2	---------------------------NOTE--------------------------- Functions 5 and 6 only. --- Perform CHANNEL CALIBRATION.	92 days
TSR 3.3.b.3	---------------------------NOTE--------------------------- 1. Function 3 only. 2. Neutron detectors are excluded. --- Perform CHANNEL CALIBRATION.	18 months
TSR 3.3.b.4	---------------------------NOTE--------------------------- Functions 1, 2, and 4 only. --- Perform CHANNEL CALIBRATION.	24 months

Table T3.3.b-1 (page 1 of 1)
Post Accident Monitoring Instrumentation

FUNCTION	REQUIRED CHANNELS
1. Drywell Air Temperature	2
2. Safety/Relief Valve Position Indicators — Acoustic and Temperature	2/valve (1 each)
3. Source Range Neutron Monitors	2
4. Torus Air Temperature	2
5. Drywell H_2 Concentration Analyzer and Monitor	2
6. Drywell O_2 Concentration Analyzer and Monitor	2

3.3 INSTRUMENTATION

3.3.c Explosive Gas Monitoring Instrumentation

TLCO 3.3.c The explosive gas monitoring instrumentation channels in Table T3.3.c-1 shall be OPERABLE with their Alarm/Trip Setpoints set to ensure that the limits of the Explosive Gas and Storage Tank Radioactivity Monitoring Program are not exceeded.

APPLICABILITY: During operation of the Offgas Holdup System.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required channel inoperable.	A.1.1 Take grab samples. OR	Once per 4 hours (continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.1.2 ---------NOTE-------- Only applicable if recombiner(s) temperature remains constant and THERMAL POWER has not changed. --------------------- Take grab samples.	 Once per 8 hours
	AND	
	A.2 Analyze grab samples.	Within 4 hours following each grab sample
	AND	
	A.3.1 Restore channel to OPERABLE status.	30 days
	OR	
	A.3.2 Prepare a corrective action program report.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
TSR 3.3.c.1 Perform CHANNEL CHECK.	24 hours
TSR 3.3.c.2 Perform CHANNEL FUNCTIONAL TEST.	31 days
TSR 3.3.c.3 Perform CHANNEL CALIBRATION.	180 days

Table T3.3.c-1 (page 1 of 1)
Explosive Gas Monitoring Instrumentation

INSTRUMENT	REQUIRED CHANNELS
Main Condenser Offgas Treatment System Explosive Gas Monitoring System — Hydrogen Monitor	1

3.3 INSTRUMENTATION

3.3.d Suppression Chamber and Drywell Spray Actuation Instrumentation

TLCO 3.3.d The suppression chamber and drywell spray actuation instrumentation shown in Table 3.3.d-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable in one trip system.	A.1 Place one inoperable channel in trip such that it will not prevent containment spray.	24 hours
B. One or more channels inoperable in both trip systems. <u>OR</u> Required Action and Associated Completion Time of Condition A not met.	B.1 Declare Suppression Chamber and Drywell Spray Actuation mode of the Residual Heat Removal system inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

---NOTES---

1. Refer to Table T3.3.d-1 to determine which TSRs apply to each Function.

2. When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains suppression chamber and drywell spray actuation capability.

SURVEILLANCE		FREQUENCY
TSR 3.3.d.1	Perform CHANNEL CHECK.	24 hours
TSR 3.3.d.2	Perform CHANNEL FUNCTIONAL TEST.	92 days
TSR 3.3.d.3	Calibrate the trip units.	92 days
TSR 3.3.d.4	Perform CHANNEL CALIBRATION.	92 days
TSR 3.3.d.5	Perform CHANNEL CALIBRATION.	24 months
TSR 3.3.d.6	Perform LOGIC SYSTEM FUNCTIONAL TEST.	24 months

Table T3.3.d-1 (page 1 of 1)
Suppression Chamber and Drywell Spray Actuation Instrumentation

FUNCTION	REQUIRED NUMBER OF CHANNELS PER TRIP SYSTEM	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Drywell Pressure — High (permissive)	2	TSR 3.3.d.2 TSR 3.3.d.4 TSR 3.3.d.6	$\geq$ 0.56 psig and $\leq$ 1.44 psig
2. Reactor Vessel Water Level — Low (permissive)	1	TSR 3.3.d.1 TSR 3.3.d.2 TSR 3.3.d.3 TSR 3.3.d.5 TSR 3.3.d.6	$\geq$ -175.7 inches

3.3 INSTRUMENTATION

3.3.e Toxic Gas Monitoring System

TLCO 3.3.e The Toxic Gas Monitoring System shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, 4, and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Toxic Gas Monitoring System inoperable.	A.1 Initiate and maintain Control Room Emergency Ventilation System in the isolation mode of operation.	1 hour
B. One Toxic Gas Monitor channel inoperable.	B.1 Restore channel to OPERABLE status.	30 days
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Prepare a corrective action program report (Condition Report).	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.3.e.1	Perform CHANNEL CHECK.	12 hours
TSR 3.3.e.2	Perform CHANNEL FUNCTIONAL TEST.	92 days
TSR 3.3.e.3	Perform CHANNEL CALIBRATION. The Allowable Value shall be < 50 ppm concentration of ammonia.	12 months

3.3 INSTRUMENTATION

3.3.f Reactor Water Cleanup (RWCU) Area Temperature Monitoring

TLCO 3.3.f Temperature monitors listed in Table T3.3f-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3 with the RWCU system unisolated.

ACTIONS

--NOTE--
Separate Condition entry is allowed for each temperature monitor.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. With one temperature monitor inoperable.	A.1 Restore inoperable temperature monitor to OPERABLE status. <u>AND</u>	30 days (continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2.1	---------NOTE--------- For RWCU heat exchanger and Phase Separator Rooms only. ---------------------- Observe area temperature. AND	1 hour AND twice per shift thereafter
	A.2.2	---------NOTE--------- For D Heater Bay area only. ---------------------- Monitor Non-Regenerative Heat Exchanger Discharge temperature and RWCU Discharge Pressure.	1 hour AND twice per shift thereafter
B. With less than the minimum requirement in any area. OR One or more Main Steam Tunnel Temperature Isolation Bypass switches at panel 901-4 in bypass. OR Required Action and Associated Completion Time of Condition A not met.	B.1	Isolate the RWCU system.	1 hour

SURVEILLANCE REQUIREMENTS

--NOTE--
TSRs apply to each monitor in Table T3.3.f-1.

SURVEILLANCE		FREQUENCY
TSR 3.3.f.1	--------------------------NOTE-------------------------------- Not required for Main Steam Tunnel Temperature switches. --- Perform a resistance check of the temperature monitor.	24 months
TSR 3.3.f.2	Perform a functional test of the temperature monitor.	24 months
TSR 3.3.f.3	Perform a logic test of the temperature monitor.	24 months
TSR 3.3.f.4	Perform a calibration of the temperature monitor.	24 months

Table T3.3.f-1 (page 1 of 1)
RWCU Temperature Monitoring

PARAMETER	INSTRUMENT	AFFECTED LOGIC	MINIMUM REQUIREMENT
RWCU Heat Exchanger Room Temperature	1(2)-1291-60K 1(2)-1291-60L	RWCU Isolation Panel 2201(2)-77B	1
	1(2)-1291-60N 1(2)-1291-60P	RWCU Isolation Panel 2201(2)-77A	1
Phase Separator Area	1(2)-1291-60J 1(2)-1291-60M	RWCU System Panels 2201-(2)-77A and 2201(2)-77B	2
D Heater Bay	1(2)-1291-60R 1(2)-1291-60S	RWCU System Panel 2201-(2)-77B	1
	1(2)-1291-60T 1(2)-1291-60U	RWCU System Panel 2201-(2)-77A	1
MST Temperature Isolation Bypass[(a)]	NA	RWCU Inboard and Outboard Isolation Valves	NA

(a) Either bypass switch at panel 901(2)-4 in bypass.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.a Structural Integrity

TLCO 3.4.a The structural integrity of ASME Code Class 1, 2, and 3 components shall be maintained in accordance with the Inservice Inspection and Testing Programs.

APPLICABILITY: MODES 1, 2, 3, 4, and 5.

ACTIONS

--NOTE--
Separate Condition entry is allowed for each component.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ---------------NOTE------------- Only applicable to ASME Code Class 1 components. ------------------------------------ Structural integrity of one or more ASME component(s) not in conformance.	A.1 Restore the structural integrity of the affected component to within its limits. <u>OR</u> A.2 Isolate the affected component.	Prior to increasing the RCS temperature to > 50°F above the minimum temperature required by NDT considerations Prior to increasing the RCS temperature to > 50°F above the minimum temperature required by NDT considerations

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. --------------NOTE-------------- Only applicable to ASME Code Class 2 components. ------------------------------------ Structural integrity of one or more ASME component(s) not in conformance.	B.1 Restore the structural integrity of the affected components to within its limits.	Immediately
	<u>OR</u>	
	B.2 Isolate the affected component.	Immediately
C. ---------------NOTE------------- Only applicable to ASME Code Class 3 components. ------------------------------------ Structural integrity of one or more ASME component(s) not in conformance.	C.1 Restore the structural integrity of the affected components to within its limits.	Immediately
	<u>OR</u>	
	C.2 Isolate the affected component.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
TSR 3.4.a.1 Verify the structural integrity of ASME Code Class 1, 2, and 3 components.	In accordance with the Inservice Inspection and Testing Programs

3.4 REACTOR COOLANT SYSTEM

3.4.b Reactor Coolant System (RCS) Chemistry

TLCO 3.4.b The chemistry of the RCS shall be maintained within the limits specified in Table T3.4.b-1.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RCS chemistry not within limits in MODE 1.	A.1 Determine chlorides. AND	Once per 8 hours when conductivity is not within limit
	A.2 Perform TSR 3.4.b.4. AND	Once per 24 hours when conductivity is not within limit
	A.3 Restore RCS chemistry to within limits.	72 hours AND 336 hours cumulative in the past 365 days
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 2.	8 hours

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Conductivity > 10 µmho/cm at 25°C in MODE 1. OR Chloride concentration > 0.5 ppm in MODE 1.	C.1 Be in MODE 2.	12 hours
D. -------------NOTE------------- Not applicable during Noble Metal Chemical Applications (injection and cleanup periods). ---------------------------------- RCS chemistry not within required limits in MODE 2 or 3.	D.1 Determine chlorides. AND D.2 Perform TSR 3.4.b.4. AND D.3 Restore RCS chemistry to within limits.	Once per 8 hours when conductivity is not within limit Once per 24 hours when conductivity is not within limit 48 hours
E. Required Action and associated Completion Time of Condition D not met.	E.1 Be in MODE 3. AND E.2 Be in MODE 4.	12 hours 36 hours
F. RCS chemistry not within required limits in MODE 3 during Noble Metal Chemical Application (injection and cleanup).	F.1 Initiate action to be in MODE 4.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.4.b.1	--------------------------------NOTE------------------------------ Only applicable when the continuous recording conductivity monitor is inoperable. --- Obtain an in-line conductivity measurement of the reactor coolant.	4 hours
TSR 3.4.b.2	Analyze a sample of the reactor coolant for chlorides and conductivity.	72 hours
TSR 3.4.b.3	-----------------------------NOTE------------------------------ Only applicable during Noble Metal application (injection and cleanup). --- Analyze a sample of the reactor coolant for pH.	72 hours
TSR 3.4.b.4	Perform a CHANNEL CHECK of the continuous conductivity monitor with an in-line flow cell.	7 days

Table T3.4.b-1 (page 1 of 1)
Reactor Coolant System Chemistry Limits

MODE	CHLORIDES (ppm)	CONDUCTIVITY (μmhos/cm at 25°C)
1	≤ 0.2	≤ 1.0
2, 3[a]	≤ 0.1	≤ 2.0
3[b]	≤ 0.1	≤ 10.0

(a) Except during Noble Metal Chemical Applications.

(b) During Noble Metal Chemical Applications.

3.6 CONTAINMENT SYSTEMS

3.6.a Residual Heat Removal (RHR) Drywell Spray

TLCO 3.6.a Two RHR drywell spray subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One RHR drywell spray subsystem inoperable.	A.1 Restore RHR drywell spray subsystem to OPERABLE status.	7 days
B. Two RHR drywell spray subsystems inoperable.	B.1 Restore one RHR drywell spray subsystem to OPERABLE status.	8 hours
C. Required Action and associated Completion Time not met.	C.1 Enter TLCO 3.0.c.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.6.a.1	Verify each RHR drywell spray subsystem manual and power operated valve in the flow path that is not locked, sealed, or otherwise secured in position, is in the correct position or can be aligned to the correct position.	31 days
TSR 3.6.a.2	Verify each RHR drywell spray nozzle is unobstructed by performance of an air or smoke flow test of the RHR drywell spray nozzles.	10 years

3.7 PLANT SYSTEMS

3.7.a Residual Heat Removal Service Water (RHRSW) System — Shutdown

TLCO 3.7.a For each required OPERABLE RHR system, a RHRSW subsystem shall be OPERABLE.

APPLICABILITY: MODES 4 and 5,
During movement of recently irradiated fuel assemblies in secondary containment,
During operations with a potential for draining the reactor vessel.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required RHRSW subsystems inoperable.	A.1 Declare supported safety-related equipment inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.7.a.1	Verify each RHRSW manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position or can be aligned to the correct position.	31 days

3.7 PLANT SYSTEMS

3.7.b Diesel Generator Cooling Water (DGCW) System — Shutdown

TLCO 3.7.b The DGCW System shall be OPERABLE with:

1. One OPERABLE DGCW pump per required subsystem, and
2. An OPERABLE flow path capable of taking suction from the Ultimate Heat Sink and transferring water to the associated diesel generator.
3. An operable DGCW pump capable of transferring cooling water to the Emergency Core Cooling System (ECCS) room emergency coolers.

APPLICABILITY: MODES 4 and 5 when the associated diesel generator or ECCS is required to be OPERABLE.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each DGCW subsystem.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required DGCW subsystem inoperable and not capable of supporting its associated DG.	A.1 Declare associated diesel generator inoperable.	Immediately

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required DGCW subsystem inoperable and not capable of supporting the ECCS room emergency coolers.	B.1 Align a DGCW subsystem to the ECCS room emergency coolers.	1 hour
	<u>OR</u>	
	B.2 Evaluate ECCS operability without ECCS room emergency coolers.	1 hour
	<u>OR</u>	
	B.3 Declare the supported ECCS components inoperable.	1 hour

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.7.b.1	Verify each required DGCW subsystem valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position or can be aligned to the correct position.	31 days
TSR 3.7.b.2	Verify each required DGCW pump starts automatically on an actual or simulated initiation signal.	24 months

3.7 PLANT SYSTEMS

3.7.c Ultimate Heat Sink (UHS) — Shutdown

TLCO 3.7.c The UHS shall be OPERABLE.

APPLICABILITY: MODES 4 and 5,
During movement of irradiated fuel assemblies in secondary containment,
During CORE ALTERATIONS,
During operations with the potential for draining the reactor vessel.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. UHS inoperable in MODE 4 and 5.	A.1 Declare the required Residual Heat Removal Service Water subsystems and Diesel Generator Cooling Water subsystems inoperable.	Immediately
B. UHS inoperable during movement of irradiated fuel assemblies in secondary containment, during CORE ALTERATIONS or during operations with the potential for draining the reactor vessel.	B.1 Declare the required Diesel Generator Cooling Water subsystems inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.7.c.1	Verify average water temperature is $\leq$ 95°F.	24 hours
TSR 3.7.c.2	Verify water level is $\geq$ 568 ft mean sea level.	24 hours

3.7 PLANT SYSTEMS

3.7.d Liquid Holdup Tanks

TLCO 3.7.d The quantity of radioactive material contained in any outside tanks shall be less than or equal to the limits calculated in the OFFSITE DOSE CALCULATION MANUAL.

APPLICABILITY: At all times.

ACTIONS

---NOTE---
Separate Conditions entry is allowed for each tank.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Quantity of radioactive material in one or more of the outside tanks not within limits.	A.1 Suspend all additions of radioactive material to the affected tank(s). <u>AND</u> A.2 Reduce affected tank contents to within limits.	Immediately 48 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.7.d.1	------------------------------NOTE------------------------------ Not required to be performed for 7 days if when tank(s) is empty at the start of addition. --- Determine the quantity of radioactive material of each outside tank is within limits by analyzing a representative sample of the tank's contents.	7 days when radioactive materials are being added to the tank(s) AND Once within 7 days after each completion of radioactive material to the tank

3.7 PLANT SYSTEMS

3.7.e Explosive Gas Mixture

TLCO 3.7.e The concentration of hydrogen in the Offgas Holdup System shall be ≤ 4% by volume.

APPLICABILITY: During Offgas Holdup System operation.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Hydrogen concentration in the Offgas Holdup System > 4% by volume.	A.1 Restore concentration to within limit.	48 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
TSR 3.7.e.1 Verify hydrogen concentration in the Offgas Holdup System is ≤ 4% by volume.	24 hours

3.7 PLANT SYSTEMS

3.7.f Flood Protection

TLCO 3.7.f Flood protection shall be available for all required safe shutdown systems, components, and structures.

APPLICABILITY: At all times.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Water level > 586 ft mean sea level USGS datum.	A.1 Initiate applicable flood protection measures.	Immediately
B. Water level > 594 ft mean sea level USGS datum. OR Water level predicted to be > 594 ft mean sea level USGS datum in ≤ 72 hours.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.7.f.1	-----------------------------NOTE------------------------------- Not required to be performed if water level is < 585.5 ft mean sea level USGS datum. --- Determine water level at the plant intake bay.	2 hours
TSR 3.7.f.2	Determine water level at the plant intake bay.	24 hours

3.7 PLANT SYSTEMS

3.7.g Sealed Source Contamination

TLCO 3.7.g Each sealed source containing radioactive material either in excess of 100 μCi of beta and/or gamma emitting material or 5 μCi of alpha emitting material shall be free of ≥ 0.005 μCi of removable contamination.

APPLICABILITY: At all times.

ACTIONS

---NOTE---
Separate Condition entry is allowed for each source.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. -------------NOTE------------- Required Actions A.2 and A.3 shall be completed whenever Condition A is entered. ---------------------------------- One or more sealed sources with removable contamination not within limits.	A.1 Withdraw the sealed source from use. AND A.2.1 Initiate action to decontaminate and repair the sealed source. OR	Immediately Immediately (continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2.2	Initiate action to dispose of the sealed source in accordance with NRC Regulations.	Immediately
	AND		
	A.3	Initiate a corrective action program report.	Immediately

SURVEILLANCE REQUIREMENTS

---NOTES---

1. Each sealed source shall be tested for leakage and/or contamination by the licensee, or other persons specifically authorized by the Commission or Agreement State.

2. The test method shall have a detection sensitivity of at least 0.005 μCi per test sample.

3. Startup sources and fission detectors previously subjected to core flux are exempted from the TSRs.

4. Sealed sources which are continuously enclosed within a shielded mechanism (i.e., sealed sources within radiation monitoring or boron measuring devices) are considered to be stored and need not be tested unless they are removed from the shielded mechanism.

SURVEILLANCE		FREQUENCY
TSR 3.7.g.1	----------------------------NOTE--------------------------- Only required to be performed on sources in use. -- Perform leakage testing for all sealed sources containing radioactive materials with a half-life > 30 days (excluding Hydrogen 3) and in any form other than gas.	184 days
TSR 3.7.g.2	-------------------------NOTES-------------------------------- 1. Only required to be performed on stored sources not in use. 2. Only required to be performed if not tested within the previous 6 months. --- Perform leakage testing for each sealed source and fission detector.	Prior to use or transfer to another licensee

(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.7.g.3	--------------------------------NOTE------------------------------- Only required to be performed on stored sources not in use. --- Perform leakage testing on sealed sources and fission detectors transferred without a certificate indicating the last test date.	Prior to use
TSR 3.7.g.4	------------------------------NOTE--------------------------------- Only required to be performed on sealed startup sources and fission detectors not previously subjected to core flux. --- Perform leakage testing for each sealed startup source and fission detector.	Once within 31 days prior to being subjected to core flux or installed in the core or following repair or maintenance to sources

3.7 PLANT SYSTEMS

3.7.h Snubbers

--NOTE---
Superseded by Technical Specification Limiting Condition for Operation (LCO) 3.0.8 and Technical Requirement Program 5.5.15, Augmented Inservice Inspection Program.

3.9 REFUELING OPERATIONS

3.9.a Communications

TLCO 3.9.a — Direct communications shall be maintained between the control room and refueling platform personnel.

APPLICABILITY: During CORE ALTERATIONS,
except movement of control rods with their normal drive system.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Direct communications not maintained.	A.1 Suspend CORE ALTERATIONS.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
TSR 3.9.a.1 Demonstrate direct communications between the control room and refueling platform personnel.	Once within 1 hour prior to the start of CORE ALTERATIONS AND Once per 12 hours thereafter

5.5.1 Offsite Dose Calculation Manual

Technical Specification 5.5.1, “Offsite Dose Calculation Manual,” is implemented by the Quad Cities Offsite Dose Calculation Manual.

5.5.2 Primary Coolant Sources Outside Containment

Technical Specification 5.5.2, “Primary Coolant Sources Outside Containment,” requires controls be provided to minimize leakage from those portions of systems outside containment that could contain highly radioactive fluids during a serious transient or accident to levels as low as practicable. The program is implemented by the following procedures:

QCTP 0820-08, and QCOS 7500-05.

5.5.3 [Deleted]

5.5.4 Radioactive Effluent Controls Program

Technical Specification 5.5.4, "Radioactive Effluent Controls Program," requires controls be established to conform with 10 CFR 50.36a for control of radioactive effluents and for maintaining doses to members of the public from radioactive effluents as low as reasonably achievable. This program is implemented through Sections 12.2, 12.3, 12.4, and 12.5 of the Quad Cities Station Offsite Dose Calculation Manual.

5.5.5 Component Cyclic or Transient Limit Program

Technical Specification 5.5.5, "Component Cyclic or Transient Limit Program," requires controls be provided to track the UFSAR, Table 3.9-1, cyclic and transient occurrences to ensure that components are maintained within design limits. The program is implemented by ER-AA-470.

5.5.6 Inservice Testing Program

The INSERVICE TESTING PROGRAM requires controls be established for inservice testing of ASME Code Class 1, 2, and 3, pumps and valves. This program is implemented by the following:

IST-QDC-PLAN and the applicable procedures that implement the ASME Code for Operation and Maintenance of Nuclear Power Plants (i.e., the OM Code) requirements.

5.5.7 Ventilation Filter Testing Program (VFTP)

Technical Specification 5.5.7, "Ventilation Filter Testing Program (VFTP)," requires testing of the Engineered Safety Feature filter ventilation systems for the following Technical Specification systems:

Control Room Emergency Ventilation System and Standby Gas Treatment System.

The program is implemented by QCIS 5700-04, QCIS 7500-01, QCMPM 7500-01, QCMPM 9400-01, QCMPM 9400-02, QCTS 0810-08, QCOS 7500-07, QCOS 7500-05, QCOS 5750-11.

In addition, laboratory analysis required by Technical Specification 5.5.7.c must be completed within 31 days after removal of a representative sample.

5.5.8 Explosive Gas and Storage Tank Radioactivity Monitoring Program

Explosive Gas Monitoring:

Technical Specification 5.5.8, "Explosive Gas and Storage Tank Radioactivity Monitoring Program," requires controls be provided for potentially explosive gas mixtures contained in the Off-gas System and the quantity of radioactivity contained in the unprotected outdoor storage tanks. The program is implemented by TRM Specification 3.3.c, "Explosive Gas Monitoring Instrumentation," TRM Specification 3.7.d, "Liquid Holdup Tanks," TRM Specification 3.7.e, "Explosive Gas Mixtures," and procedures QCOP 2700-07, QCIS 5400-03, QOS 0005-01, CY-QC-120-600, QCIS 5400-04, QCIS 5400-05, QCIS 5400-06, CY-QC-110-601.

Storage Tank Radioactivity Monitoring:

CY-AB-120-200

5.5.9 Diesel Fuel Oil Testing Program

Technical Specification 5.5.9, "Diesel Fuel Oil Testing Program," requires testing requirements be provided for new fuel oil and stored fuel oil and includes sampling requirements and acceptance criteria. The program is implemented by the following procedures:

CY-QC-110-630 and CY-QC-130-700.

5.5.10 Technical Specification Bases Control Program

Technical Specification 5.5.10, "Technical Specification Bases Control Program," requires means be provided for processing changes to the Bases of the Technical Specifications. The program is implemented by Appendix D of the Technical Requirements Manual.

5.5.11 Safety Function Determination Program

Technical Specification 5.5.11, "Safety Function Determination Program," requires means be provided to ensure a loss of function is detected and appropriate actions taken. The program is implemented by Appendix C of the Technical Requirements Manual.

5.5.12 Primary Containment Leakage Rate Testing Program

Technical Specification 5.5.12, "Primary Containment Leakage Rate Testing Program," requires implementation of leakage rate testing of the primary containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B as modified by approved exemptions. The program is implemented by ER-AA-380, QCTP 0130-01 and QCTS 0500-01.

5.5.13 Control Room Envelope Habitability Program

Technical Specification 5.5.13, "Control Room Envelope Habitability Program," requires implementation of a program to ensure that the Control Room Envelope (CRE) habitability is maintained such that, with an OPERABLE Control Room Emergency Ventilation (CREV) System, CRE occupants can control the reactor safely under normal conditions and maintain it in a safe condition following a radiological event, hazardous chemical release, or a smoke challenge. The program shall ensure that adequate radiation protection is provided to permit access and occupancy of the CRE under design basis accident (DBA) conditions without personnel receiving radiation exposure in excess of 5 rem total effective dose equivalent (TEDE) for the duration of the accident. The program is implemented by the following procedures:

ER-QC-390, ER-QC-390-1001, and QCTP 0440-07.

5.5.14 Surveillance Frequency Control Program (SFCP)

The SFCP ensures that Surveillance Requirements specified in the Technical Specifications are performed at intervals sufficient to assure the associated Limiting Conditions for Operation (LCOs) are met. The provisions of Technical Specifications Surveillance Requirements 3.0.2 and 3.0.3 are applicable to the Frequencies established in the SFCP. The SFCP program document is located in Appendix I of the Technical Requirements Manual.

5.5.15 Augmented Inservice Inspection Program

Examination and testing of safety related snubbers shall be performed in accordance with the 10CFR50.55a approved edition of the ASME OMa Code, Subsection ISTD as denoted in the current revision of the Inservice Inspection Program Plan.

Table A-1
Primary Containment Isolation Devices (Unit 1)
(Page 1 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-007A	0203-1A	Main steam line	AO Valve	Inside	Open	3≤T≤5	
X-007A	0203-2A	Main steam line	AO Valve	Outside	Open	3≤T≤5	
X-007A	0220-10A	Main steam line - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0203-1A & 2A
X-007B	0203-1B	Main steam line	AO Valve	Inside	Open	3≤T≤5	
X-007B	0203-2B	Main steam line	AO Valve	Outside	Open	3≤T≤5	
X-007B	0220-10B	Main steam line - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0203-1B & 2B
X-007C	0203-1C	Main steam line	AO Valve	Inside	Open	3≤T≤5	
X-007C	0203-2C	Main steam line	AO Valve	Outside	Open	3≤T≤5	
X-007C	0220-10C	Main steam line - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0203-1C & 2C
X-007D	0203-1D	Main steam line	AO Valve	Inside	Open	3≤T≤5	
X-007D	0203-2D	Main steam line	AO Valve	Outside	Open	3≤T≤5	
X-007D	0220-10D	Main steam line - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0203-1D & 2D
X-008	0220-1	Main steam line drain	MO Valve	Inside	Closed	35	
X-008	0220-2	Main steam line drain	MO Valve	Outside	Closed	35	
X-008	0220-5	Main steam line drain - pressure test inbd stop	Manual	Outside	Closed	NA	tap between 0220-1 & 2
X-009A	0220-62B	From reactor feedwater	Check	Outside	Open	NA	
X-009A	0220-58B	From reactor feedwater	Check	Inside	Open	NA	
X-009A	0220-86B	From Rx FW - local pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0220-58B & 62B
X-009A	3299-124	From Rx FW - LLRT inboard valve	Manual	Inside	Closed	NA	tap between 0220-58B & 62B
X-009A	220-115B	From Rx FW - inboard drain valve	Manual	Inside	Closed	NA	tap between 0220-58B & Rx
X-009A	3299-122	From Rx FW - inboard vent valve	Manual	Inside	Closed	NA	tap between 0220-58B & Rx
X-009B	0220-62A	From reactor feedwater	Check	Outside	Open	NA	
X-009B	0220-58A	From reactor feedwater	Check	Inside	Open	NA	
X-009B	0220-86A	From Rx FW - local pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0220-58A & 62A
X-009B	3299-130	From Rx FW - LLRT inboard valve	Manual	Inside	Closed	NA	tap between 0220-58A & 62A
X-009B	0220-115A	From Rx FW - inboard drain valve	Manual	Inside	Closed	NA	tap between 0220-58A & Rx
X-009B	3299-128	From Rx FW - inboard vent valve	Manual	Inside	Closed	NA	tap between 0220-58A & Rx

Table A-1
Primary Containment Isolation Devices (Unit 1)
(Page 2 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-010	1301-16	RCIC turbine steam supply	MO Valve	Inside	Open	25	
X-010	1301-17	RCIC turbine steam supply	MO Valve	Outside	Open	25	
X-010	1301-18A	RCIC turbine steam supply - pressure test inbd stop	Manual	Outside	Closed	NA	tap between 1301-16 & 17
X-011	2301-4	HPCI turbine steam	MO Valve	Inside	Open	50	
X-011	2301-5	HPCI turbine steam	MO Valve	Outside	Open	63	
X-011	2301-16	HPCI turbine steam - pressure test inbd stop	Manual	Outside	Closed	NA	tap between X-11 & 2301-5
X-012	1001-47	RHR reactor shutdown cooling supply	MO Valve	Outside	Closed	40	
X-012	1001-50	RHR reactor shutdown cooling supply	MO Valve	Inside	Closed	40	
X-012	1001-48	shutdown cooling supply - press test inbd stop	Manual	Outside	Closed	NA	tap between 1001-50 & 47
X-012	1001-51A	shutdown cooling supply - inboard vent	Manual	Inside	Closed	NA	tap between 1001-50 & 47
X-013A	1001-29A	RHR reactor LPCI / shutdown cooling injection	MO Valve	Outside	Closed	NA	
X-013A	1001-28A	RHR reactor LPCI / shutdown cooling injection	MO Valve	Outside	Open	NA	
X-013A	1001-68A	RHR reactor LPCI / shutdown cooling injection	AO Check	Inside	Closed	NA	
X-013A	1001-30A	'A' LPCI loop - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1001-29A & 68A
X-013B	1001-29B	RHR reactor LPCI / shutdown cooling injection	MO Valve	Outside	Closed	NA	
X-013B	1001-28B	RHR reactor LPCI / shutdown cooling injection	MO Valve	Outside	Open	NA	
X-013B	1001-68B	RHR reactor LPCI / shutdown cooling injection	AO Check	Inside	Closed	NA	
X-013B	1001-31B	'B' LPCI / SDC loop - press test inboard stop	Manual	Outside	Closed	NA	tap between 1001-29B & 68B
X-014	1201-2	Reactor water cleanup supply	MO Valve	Inside	Open	30	
X-014	1201-5	Reactor water cleanup supply	MO Valve	Outside	Open	38	
X-014	RV-1299-87	Reactor water cleanup supply	Relief	Inside	Closed	NA	
X-014	1201-121	RWCU supply - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1201-2 & 5
X-016A	1402-24A	Core spray to reactor	MO Valve	Outside	Open	NA	
X-016A	1402-25A	Core spray to reactor	MO Valve	Outside	Closed	NA	
X-016A	1402-9A	Core spray to reactor	Check	Inside	Closed	NA	
X-016A	1402-5A	Core Spray to Rx - pump dsch press test inbd stop	Manual	Outside	Closed	NA	tap between 1402-24A & 25A
X-016A	1402-33A	Core Spray to Rx - pump dsch press test inbd stop	Manual	Outside	Closed	NA	tap between 1402-25A & 9A
X-016A	1499-51	Core Spray to Rx – Inboard Vent	Manual	Outside	Closed	NA	tap between 1402-24A & 25A
X-016B	1402-24B	Core spray to reactor	MO Valve	Outside	Open	NA	

Table A-1
Primary Containment Isolation Devices (Unit 1)
(Page 3 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-016B	1402-25B	Core spray to reactor	MO Valve	Outside	Closed	NA	
X-016B	1402-9B	Core spray to reactor	Check	Inside	Closed	NA	
X-016B	1402-5B	Core Spray to Rx - pump dsch press test inbd stop	Manual	Outside	Closed	NA	tap between 1402-24B & 25B
X-016B	1402-33B	Core Spray to Rx - pump dsch press test inbd stop	Manual	Outside	Closed	NA	tap between 1402-25B & 9B
X-018	2001-3	Drywell floor drain discharge	AO Valve	Outside	Closed	20	
X-018	2001-4	Drywell floor drain discharge	AO Valve	Outside	Closed	20	
X-018	2099-417	DW floor drain discharge - press test inbd stop	Manual	Outside	Closed	NA	tap between 2001-3 & 4
X-019	2001-15	Drywell equipment drain discharge	AO Valve	Outside	Closed	20	
X-019	2001-16	Drywell equipment drain discharge	AO Valve	Outside	Closed	20	
X-019	2099-500	DW equip drain discharge - press test inbd stop	Manual	Outside	Closed	NA	tap between 2001-15 & 16
X-020	4399-45	Clean demineralizer water in	Manual	Outside	Closed	NA	
X-020	4399-46	Clean demineralizer water in	Check	Outside	Closed	NA	
X-020	4399-347	Clean demin water in - pressure test inbd stop	Manual	Outside	Closed	NA	tap between 4399-46 & X-20
X-020	4399-349	Clean demin water in - pressure test inbd stop	Manual	Outside	Closed	NA	tap between 4399-45 & 46
X-021	4699-47	Service air to drywell	Check	Outside	Closed	NA	
X-021	4699-46	Service air to drywell	Manual	Outside	Closed	NA	
X-021	4699-314	Service air to drywell - press test inbd stop	Manual	Outside	Closed	NA	tap between 4699-46 & 47
X-022	4799-155	Instrument air to drywell	Check	Inside	Open	NA	
X-022	4799-156	Instrument air to drywell	Check	Outside	Open	NA	
X-022	4799-157	Instrument air to drywell	Manual	Outside	Open	NA	
X-022	4799-518	Inst. air to drywell - local drop shutoff valve	Manual	Outside	Closed	NA	tap between 4799-155 & 156
X-023	3799-31	Rx building closed cooling water supply	Check	Inside	Open	NA	
X-023	3702	Rx building closed cooling water supply	MO Valve	Outside	Open	NA	
X-023	3799-136	RBCCW supply - press test inbd stop	Manual	Outside	Closed	NA	tap between 3799-31 & 3702
X-024	3703	Rx building closed cooling water return	MO Valve	Outside	Open	NA	
X-024	3706	Rx building closed cooling water return	MO Valve	Inside	Open	NA	
X-024	3799-138	RBCCW return - press test inbd stop	Manual	Outside	Closed	NA	tap between 3703 & 3706
X-025	1601-23	Drywell main exhaust	AO Valve	Outside	Closed	10	
X-025	1601-62	Drywell main exhaust valve bypass (vent relief)	AO Valve	Outside	Closed	15	

Table A-1
Primary Containment Isolation Devices (Unit 1)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-025	1601-24	Main primary containment vent to Rx building exh	AO Valve	Outside	Closed	10	
X-025	1601-63	Primary Containment exhaust to SBGT system	AO Valve	Outside	Closed	10	
X-025	1601-72	Drywell main exh. / Main primary containment vent to Rx bldg exh - press test inbd stop	Manual	Outside	Closed	NA	tap between 1601-23 & 24
X-025	2599-64	ACAD to SBGT - DW PT 1641-12 test tap stop	Manual	Outside	Closed	NA	tap between X-25 & 2599-4A/B
X-025	1699-98	Hardened Containment Vent System (HCVS) inlet	AO Valve	Outside	Closed	NA	Can only be opened using HCVS nitrogen supply – spring closed
X-026	1601-55	Drywell nitrogen purge inlet	AO Valve	Outside	Open	10	
X-026	1601-21	Drywell purge inlet	AO Valve	Outside	Closed	10	
X-026	1601-22	Drywell purge inlet	AO Valve	Outside	Closed	10	
X-026	1601-74	Drywell purge inlet - press test inbd stop	Manual	Outside	Closed	NA	tap between 1601-21 & 22
X-026	RV-8799-214	Nitrogen makeup	Relief	Outside	Closed	NA	
X-026	1601-57	Nitrogen makeup	MO Valve	Outside	Open	15	
X-026	1601-59	Nitrogen makeup to Drywell	AO Valve	Outside	Open	15	
X-026	8803	Oxygen analyzer return	AO Valve	Outside	Open	10	
X-026	8804	Oxygen analyzer return	AO Valve	Outside	Open	10	
X-026	1601-77	Oxygen analyzer return - DW air sample system pressure test stop	Manual	Outside	Closed	NA	tap between X-26 & 8804 / 1601-21
X-027C	PT 1-1624 test tap	Drywell pressure	NA	Outside	Cap Installed	NA	
X-027C	PT 1-1625 test tap	Drywell pressure	NA	Outside	Cap Installed	NA	
X-027C	DPT 1-1641-51 high side test tap	Drywell to Suppression Chamber differential pressure	NA	Outside	Cap Installed	NA	low side sensing line from X-205
X-030D	0220-451A 0220-452A	'A' RR Pump 1st stage seal pressure instrumentation/vent line	Check	2/Outside	Open	N/A	The check valve is held open by CRD flow
X-030E	0220-176A	'A' RR Pmp DPT 0261-5A & DPIS 0261-35A,C,E,G low inboard vent	Manual	Outside	Closed	NA	tap between X-30E & 0220-13A
X-030F	0220-174A	'A' RR Pmp DPT 0261-5A & DPIS 0261-35A,C,E,G high inboard vent	Manual	Outside	Closed	NA	tap between X-30F & 0220-14A

Table A-1
Primary Containment Isolation Devices (Unit 1)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-031C	0220-451B 0220-452B	'B' RR Pump 1st stage seal pressure instrumentation/vent line	Check	2/Outside	Open	N/A	The check valve is held open by CRD flow
X-031E	0220-176B	'B' RR Pmp DPT 0261-5B & DPIS 0261-35B,D,F,H low inboard vent	Manual	Outside	Closed	NA	tap between X-31E & 0220-13B
X-031F	0220-174B	'B' RR Pmp DPT 0261-5B & DPIS 0261-35B,D,F,H high inboard vent	Manual	Outside	Closed	NA	tap between X-31F & 0220-14B
X-032	4720	Drywell pneumatic suction X-32D	AO Valve	Outside	Open	10	
X-032	4721	Drywell pneumatic suction X-32D	AO Valve	Outside	Open	10	
X-033	2499-1A	CAM/drywell	SO Valve	Outside	Closed	NA	
X-033	2499-2A	CAM/drywell	SO Valve	Outside	Closed	NA	
X-033	2499-7A	CAM/drywell - press test inbd stop	Manual	Outside	Closed	NA	tap between 2499-1A & 2A
X-035B	0737-1C	Traversing in-core probe	SO Valve	Outside	Closed	NA	
X-035B	0737-2C	Traversing in-core probe	Shear	Outside	Open	NA	
X-035C	0737-1B	Traversing in-core probe	SO Valve	Outside	Closed	NA	
X-035C	0737-2B	Traversing in-core probe	Shear	Outside	Open	NA	
X-035D	0737-1D	Traversing in-core probe	SO Valve	Outside	Closed	NA	
X-035D	0737-2D	Traversing in-core probe	Shear	Outside	Open	NA	
X-035E	0737-1F	Traversing in-core probe	SO Valve	Outside	Closed	NA	
X-035E	0737-2F	Traversing in-core probe	Shear	Outside	Open	NA	
X-035F	0737-1E	Traversing in-core probe	SO Valve	Outside	Closed	NA	
X-035F	0737-2E	Traversing in-core probe	Shear	Outside	Open	NA	
X-035G	0743	Traversing in-core probe purge	Check	Outside	Closed	NA	
X-039A	1001-26A	RHR - containment spray	MO Valve	Outside	Closed	NA	
X-039A	1001-23A	RHR - containment spray	MO Valve	Outside	Closed	NA	
X-039A	1099-166	RHR - containment spray	Manual	Outside	Closed	NA	tap between 1001-26A & 23A
X-039A	1001-26A bonnet test tap	RHR - containment spray	NA	Outside	Cap Installed	NA	bonnet test tap cap for 1001-26A
X-039A	1001-25A	'A' Containment Spray - loop inboard drain	Manual	Outside	Closed	NA	tap between 1001-23A & 26A
X-039B	1001-26B	RHR - containment spray	MO Valve	Outside	Closed	NA	

Table A-1
Primary Containment Isolation Devices (Unit 1)
(Page 6 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-039B	1001-23B	RHR - containment spray	MO Valve	Outside	Closed	NA	
X-039B	1001-26B bonnet test tap	RHR - containment spray	NA	Outside	Cap Installed	NA	bonnet test tap cap for 1001-26B
X-039B	1001-25B	'B' Containment Spray - loop inboard drain	Manual	Outside	Closed	NA	tap between 1001-23B & 26B
X-039B	1001-196	'B' Containment Spray - loop pressure test	Manual	Outside	Closed	NA	tap between 1001-23B & 26B
X-039B	Blind Flange	RHR DW spray blind flange	NA	Outside	Installed	NA	between 1001-23B & 26B
X-041	0220-44	Reactor water sample	AO Valve	Inside	Open	5	
X-041	0220-45	Reactor water sample	AO Valve	Outside	Open	5	
X-041	0220-43	Reactor water sample - press test inbd stop	Manual	Outside	Closed	NA	tap between 0220-44 & 45
X-043	8800-02B	Particulate sample lines (line B)	Manual	Outside	Closed	NA	
X-043	8800-03B	Particulate sample lines (line B)	Manual	Outside	Closed	NA	
X-043	8800-02C	Particulate sample lines (line C)	Manual	Outside	Closed	NA	
X-043	8800-03C	Particulate sample lines (line C)	Manual	Outside	Closed	NA	
X-043	8800-02D	Particulate sample lines (line D)	Manual	Outside	Closed	NA	
X-043	8800-03D	Particulate sample lines (line D)	Manual	Outside	Closed	NA	
X-043	8800-02E	Particulate sample lines (line E)	Manual	Outside	Closed	NA	
X-043	8800-03E	Particulate sample lines (line E)	Manual	Outside	Closed	NA	
X-043	8800-02F	Particulate sample lines (line F)	Manual	Outside	Closed	NA	
X-043	8800-03F	Particulate sample lines (line F)	Manual	Outside	Closed	NA	
X-043	8800-02G	Particulate sample lines (line G)	Manual	Outside	Closed	NA	
X-043	8800-03G	Particulate sample lines (line G)	Manual	Outside	Closed	NA	
X-043	8800-02H	Particulate sample lines (line H)	Manual	Outside	Closed	NA	
X-043	8800-03H	Particulate sample lines (line H)	Manual	Outside	Closed	NA	
X-043	8800-02I	Particulate sample lines (line I)	Manual	Outside	Closed	NA	
X-043	8800-03I	Particulate sample lines (line I)	Manual	Outside	Closed	NA	
X-043	8800-02J	Particulate sample lines (line J)	Manual	Outside	Closed	NA	
X-043	8800-03J	Particulate sample lines (line J)	Manual	Outside	Closed	NA	
X-043	8800-02K	Particulate sample lines (line K)	Manual	Outside	Closed	NA	
X-043	8800-03K	Particulate sample lines (line K)	Manual	Outside	Closed	NA	

Table A-1
Primary Containment Isolation Devices (Unit 1)
(Page 7 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-043	8800-02L	Particulate sample lines (line L)	Manual	Outside	Closed	NA	
X-043	8800-03L	Particulate sample lines (line L)	Manual	Outside	Closed	NA	
X-043	8800-02M	Particulate sample lines (line M)	Manual	Outside	Closed	NA	
X-043	8800-03M	Particulate sample lines (line M)	Manual	Outside	Closed	NA	
X-043	8800-02N	Particulate sample lines (line N)	Manual	Outside	Closed	NA	
X-043	8800-03N	Particulate sample lines (line N)	Manual	Outside	Closed	NA	
X-043	8800-02O	Particulate sample lines (line O)	Manual	Outside	Closed	NA	
X-043	8800-03O	Particulate sample lines (line O)	Manual	Outside	Closed	NA	
X-043	8800-02P	Particulate sample lines (line P)	Manual	Outside	Closed	NA	
X-043	8800-03P	Particulate sample lines (line P)	Manual	Outside	Closed	NA	
X-043	8800-02Q	Particulate sample lines (line Q)	Manual	Outside	Closed	NA	
X-043	8800-03Q	Particulate sample lines (line Q)	Manual	Outside	Closed	NA	
X-043	8800-02R	Particulate sample lines (line R)	Manual	Outside	Closed	NA	
X-043	8800-03R	Particulate sample lines (line R)	Manual	Outside	Closed	NA	
X-043	8800-02S	Particulate sample lines (line S)	Manual	Outside	Closed	NA	
X-043	8800-03S	Particulate sample lines (line S)	Manual	Outside	Closed	NA	
X-043	8800-02T	Particulate sample lines (line T)	Manual	Outside	Closed	NA	
X-043	8800-03T	Particulate sample lines (line T)	Manual	Outside	Closed	NA	
X-043	8800-02U	Particulate sample lines (line U)	Manual	Outside	Closed	NA	
X-043	8800-03U	Particulate sample lines (line U)	Manual	Outside	Closed	NA	
X-043	8800-02V	Particulate sample lines (line V)	Manual	Outside	Closed	NA	
X-043	8800-03V	Particulate sample lines (line V)	Manual	Outside	Closed	NA	
X-043	8801A	Drywell oxygen analyzer sample (line A)	AO Valve	Outside	Open	10	
X-043	8802A	Drywell oxygen analyzer sample (line A)	AO Valve	Outside	Open	10	
X-043	8801B	Drywell oxygen analyzer sample (line B)	AO Valve	Outside	Open	10	
X-043	8802B	Drywell oxygen analyzer sample (line B)	AO Valve	Outside	Open	10	
X-043	8801C	Drywell oxygen analyzer sample (line C)	AO Valve	Outside	Open	10	
X-043	8802C	Drywell oxygen analyzer sample (line C)	AO Valve	Outside	Open	10	
X-044	4799-176	HVAC instrument penetration	Manual	Outside	Closed	NA	capped line

Table A-1
Primary Containment Isolation Devices (Unit 1)
(Page 8 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-044	4799-489A	HVAC instrument penetration (line A)	Manual	Outside	Closed	NA	capped line
X-044	4799-489B	HVAC instrument penetration (line B)	Manual	Outside	Closed	NA	capped line
X-044	4799-489C	HVAC instrument penetration (line C)	Manual	Outside	Closed	NA	capped line
X-044	4799-489D	HVAC instrument penetration (line D)	Manual	Outside	Closed	NA	capped line
X-044	4799-489E	HVAC instrument penetration (line E)	Manual	Outside	Closed	NA	capped line
X-044	4799-489F	HVAC instrument penetration (line F)	Manual	Outside	Closed	NA	capped line
X-044	4799-489G	HVAC instrument penetration (line G)	Manual	Outside	Closed	NA	capped line
X-044	4799-489H	HVAC instrument penetration (line H)	Manual	Outside	Closed	NA	capped line
X-044	4799-489J	HVAC instrument penetration (line J)	Manual	Outside	Closed	NA	capped line
X-044	4799-489K	HVAC instrument penetration (line K)	Manual	Outside	Closed	NA	capped line
X-044	4799-489L	HVAC instrument penetration (line L)	Manual	Outside	Closed	NA	capped line
X-044	4799-489M	HVAC instrument penetration (line M)	Manual	Outside	Closed	NA	capped line
X-044	4799-489N	HVAC instrument penetration (line N)	Manual	Outside	Closed	NA	capped line
X-044	4799-489P	HVAC instrument penetration (line P)	Manual	Outside	Closed	NA	capped line
X-044	4799-489Q	HVAC instrument penetration (line Q)	Manual	Outside	Closed	NA	capped line
X-044	4799-489R	HVAC instrument penetration (line R)	Manual	Outside	Closed	NA	capped line
X-044	4799-489S	HVAC instrument penetration (line S)	Manual	Outside	Closed	NA	capped line
X-044	4799-489T	HVAC instrument penetration (line T)	Manual	Outside	Closed	NA	capped line
X-044	4799-489U	HVAC instrument penetration (line U)	Manual	Outside	Closed	NA	capped line
X-044	4799-489V	HVAC instrument penetration (line V)	Manual	Outside	Closed	NA	capped line
X-044	4799-489W	HVAC instrument penetration (line W)	Manual	Outside	Closed	NA	capped line
X-044	4799-489X	HVAC instrument penetration (line X)	Manual	Outside	Closed	NA	capped line
X-044	4799-489Y	HVAC instrument penetration (line Y)	Manual	Outside	Closed	NA	capped line
X-044	4799-489Z	HVAC instrument penetration (line Z)	Manual	Outside	Closed	NA	capped line
X-047	1101-16	Standby liquid control	Check	Outside	Closed	NA	
X-047	1101-15	Standby liquid control	Check	Inside	Closed	NA	
X-047	1101-34	SBLC - injection line pressure tap inboard stop	Manual	Outside	Closed	NA	tap between 1101-15 & 16
X-051	2499-22A	CAM return (position E)	Check	Outside	Closed	NA	

Table A-1
Primary Containment Isolation Devices (Unit 1)
(Page 9 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-051	2499-25A	CAM return (pos. E) - smpl outlet press test inbd stop	Manual	Outside	Closed	NA	tap between X-051 & 2499-22A
X-104D	4799-488A	Instrumentation Lines (line A)	Manual	Outside	Closed	NA	capped line
X-104D	4799-488B	Instrumentation Lines (line B)	Manual	Outside	Closed	NA	capped line
X-104D	4799-488C	Instrumentation Lines (line C)	Manual	Outside	Closed	NA	capped line
X-104D	4799-488D	Instrumentation Lines (line D)	Manual	Outside	Closed	NA	capped line
X-104D	4799-488E	Instrumentation Lines (line E)	Manual	Outside	Closed	NA	capped line
X-104D	4799-488F	Instrumentation Lines (line F)	Manual	Outside	Closed	NA	capped line
X-104D	4799-488G	Instrumentation Lines (line G)	Manual	Outside	Closed	NA	capped line
X-104E	2499-1B	CAM/drywell (pos. E)	SO Valve	Outside	Closed	NA	
X-104E	2499-2B	CAM/drywell (pos. E)	SO Valve	Outside	Closed	NA	
X-104E	2499-7B	CAM/drywell (pos. E) - press test inbd stop	Manual	Outside	Closed	NA	tap between 2499-1B & 2B
X-104E	2499-22B	CAM return (pos. C)	Check	Outside	Closed	NA	
X-104E	2499-25B	CAM return (pos. C) - smpl outlet pressure test inboard stop	Manual	Outside	Closed	NA	tap between X-104E & 2499-22B
X-106B	4799-490A	Instrumentation Lines (line A)	Manual	Outside	Closed	NA	capped line
X-106B	4799-490B	Instrumentation Lines (line B)	Manual	Outside	Closed	NA	capped line
X-106B	4799-490C	Instrumentation Lines (line C)	Manual	Outside	Closed	NA	capped line
X-106B	4799-490D	Instrumentation Lines (line D)	Manual	Outside	Closed	NA	capped line
X-106B	4799-490E	Instrumentation Lines (line E)	Manual	Outside	Closed	NA	capped line
X-106B	4799-490F	Instrumentation Lines (line F)	Manual	Outside	Closed	NA	capped line
X-106B	4799-490G	Instrumentation Lines (line G)	Manual	Outside	Closed	NA	capped line
X-108	0263-944A	RVLIS Backfill (line 1-2334A)	Check	Outside	Open	NA	
X-108	0263-945A	RVLIS Backfill (line 1-2334A)	Check	Outside	Open	NA	
X-108	0263-947A	RVLIS Backfill (line 1-2335A)	Check	Outside	Open	NA	
X-108	0263-948A	RVLIS Backfill (line 1-2335A)	Check	Outside	Open	NA	
X-108	0263-960A	RVLIS Backfill - test valve	Manual	Outside	Closed	NA	tap between 0263-944A & X-108
X-108	0263-958A	RVLIS Backfill - vent valve	Manual	Outside	Closed	NA	tap between 0263-944A & X-108
X-108	0263-955A	RVLIS Backfill - test valve	Manual	Outside	Closed	NA	tap between 0263-947A & X-108
X-108	0263-953A	RVLIS Backfill - vent valve	Manual	Outside	Closed	NA	tap between 0263-947A & X-108

Table A-1
Primary Containment Isolation Devices (Unit 1)
(Page 10 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-109	0263-944B	RVLIS Backfill (line 1-2334B)	Check	Outside	Open	NA	
X-109	0263-945B	RVLIS Backfill (line 1-2334B)	Check	Outside	Open	NA	
X-109	0263-947B	RVLIS Backfill (line 1-2335B)	Check	Outside	Open	NA	
X-109	0263-948B	RVLIS Backfill (line 1-2335B)	Check	Outside	Open	NA	
X-109	0263-960B	RVLIS Backfill - test valve	Manual	Outside	Closed	NA	tap between 0263-944B & X-109
X-109	0263-958B	RVLIS Backfill - vent valve	Manual	Outside	Closed	NA	tap between 0263-944B & X-109
X-109	0263-955B	RVLIS Backfill - test valve	Manual	Outside	Closed	NA	tap between 0263-947B & X-109
X-109	0263-953B	RVLIS Backfill - vent valve	Manual	Outside	Closed	NA	tap between 0263-947B & X-109
X-203A	1601-60	Suppression chamber main exhaust	AO Valve	Outside	Closed	10	
X-203A	1601-61	Suppression chamber main exhaust valve bypass	AO Valve	Outside	Closed	15	
X-203A	1601-24	Main primary containment vent to Rx building exh	AO Valve	Outside	Closed	10	
X-203A	1601-63	Primary Containment exhaust to SBGT system	AO Valve	Outside	Closed	10	
X-203A	1601-72	Suppression chamber main exhaust / Main primary containment vent to Rx bldg exh - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1601-60/61 & 24
X-203A	1699-98	Hardened Containment Vent System (HCVS) inlet	AO Valve	Outside	Closed	NA	Can only be opened using HCVS nitrogen supply – spring closed
X-205	1601-20A	Vacuum breaker secondary containment to suppression chamber	AO Valve	Outside	Closed	NA	
X-205	1601-31A	Vacuum breaker secondary containment to suppression chamber	Check	Outside	Closed	NA	
X-205	1601-73A	Vac. breaker secondary containment to suppression chamber - pressure test inbd stop	Manual	Outside	Closed	NA	tap between 1601-20A & 31A
X-205	1601-20B	Vacuum breaker secondary containment to suppression chamber	AO Valve	Outside	Closed	NA	
X-205	1601-31B	Vacuum breaker secondary containment to suppression chamber	Check	Outside	Closed	NA	
X-205	1601-73B	Vac. breaker secondary containment to suppression chamber - pressure test inbd stop	Manual	Outside	Closed	NA	tap between 1601-20B & 31B
X-205	1601-56	Suppression chamber purge inlet	AO Valve	Outside	Open	10	

Table A-1
Primary Containment Isolation Devices (Unit 1)
(Page 11 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-205	1601-58	Nitrogen makeup to suppression chamber	AO Valve	Outside	Closed	15	
X-205	1601-91B	Suppression chamber LT 1641-5B low side vent	Manual	Outside	Closed	NA	
X-205	DPT 1-1641-51 low side test tap	Drywell to Suppression Chamber differential pressure	NA	Outside	Cap Installed	NA	hi side sensing line from X-027C
X-205	PT 1-1622A test tap	Suppression Chamber to Reactor Building differential pressure	NA	Outside	Cap Installed	NA	
X-205	PT 1-1622B test tap	Suppression Chamber to Reactor Building differential pressure	NA	Outside	Cap Installed	NA	
X-205	PT 1-1623 test tap	Suppression Chamber pressure	NA	Outside	Cap Installed	NA	
X-206A	1601-100	Suppression chamber LG 1602-10 upper shutoff	Manual	Outside	Closed	NA	
X-206A	1699-17	Suppression chamber LT 1-1626 upper shutoff	Manual	Outside	Closed	NA	
X-206A	PT 1-1602-8B test tap	Suppression Chamber pressure	NA	Outside	Cap Installed	NA	
X-206A	LT 1-1602-9 low side test tap	Suppression Chamber level	NA	Outside	Cap Installed	NA	
X-206B	1699-16	Suppression chamber level instrumentation drain	Manual	Outside	Closed	NA	
X-206B	1601-101	Suppression chamber LG 1602-10 lower shutoff	Manual	Outside	Closed	NA	
X-206B	1699-15	Suppression chamber LT 1-1626 lower shutoff	Manual	Outside	Closed	NA	
X-206B	1699-19	Suppression chamber water reservoir fill tap	Manual	Outside	Closed	NA	
X-206B	LT 1-1602-9 high side test tap	Suppression Chamber level	NA	Outside	Cap Installed	NA	
X-206C	2399-35	Suppression chamber LS 2351A & B high side drain	Manual	Outside	Closed	NA	
X-206C	2399-38A	Suppression chamber LS 2351A drain	Manual	Outside	Closed	NA	
X-206C	2399-38B	Suppression chamber LS 2351B drain	Manual	Outside	Closed	NA	
X-206D	2399-34	Suppression chamber LS 2351A & B low side drain	Manual	Outside	Closed	NA	
X-210A	1402-4A	Core spray test to suppression pool	MO Valve	Outside	Closed	NA	
X-210A	1402-4B	Core spray test to suppression pool	MO Valve	Outside	Closed	NA	
X-210A	1001-36A	RHR test line to suppression pool	MO Valve	Outside	Closed	NA	
X-210A	2301-14	HPCI min flow bypass	MO Valve	Outside	Closed	NA	

Table A-1
Primary Containment Isolation Devices (Unit 1)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-210A	1301-47	RCIC min flow bypass	Check	Outside	Closed	NA	
X-210A	1402-38A	Core spray min bypass	MO Valve	Outside	Closed	NA	
X-210A	1402-38B	Core spray min bypass	MO Valve	Outside	Closed	NA	
X-210A	1001-18A	RHR min flow bypass	MO Valve	Outside	Open	NA	
X-210B	1001-36B	RHR test line to suppression pool	MO Valve	Outside	Closed	NA	
X-210B	1001-18B	RHR min flow bypass	MO Valve	Outside	Open	NA	
X-211A	1001-34A	RHR - suppression pool test return	MO Valve	Outside	Closed	NA	
X-211A	1001-37A	RHR to suppression spray header	MO Valve	Outside	Closed	NA	
X-211B	1001-34B	RHR-suppression pool test return	MO Valve	Outside	Closed	NA	
X-211B	1001-37B	RHR to suppression spray header	MO Valve	Outside	Closed	NA	
X-212	1301-41	RCIC turbine exhaust	Check	Outside	Closed	NA	
X-212	1301-64	RCIC turbine exhaust	Stop Check	Outside	Open	NA	
X-212	1399-105	RCIC turbine exhaust - press test inbd stop	Manual	Outside	Closed	NA	tap on 1301-64
X-212	1399-58A	RCIC turbine exhaust - press test inbd stop	Manual	Outside	Closed	NA	tap between 1301-41 & 64
X-213A	1601-86A	Supp Chamber drain - LT 1641-5A hi side press test	Manual	Outside	Closed	NA	off 1641-5A hi side sensing line
X-213A	1601-89A	Supp Chamber drain - LT 1641-5A hi side inbd drain	Manual	Outside	Closed	NA	off 1641-5A hi side sensing line
X-213B	1601-98	Supp Chamber drain - inboard drain valve	Manual	Outside	Closed	NA	
X-213B	1601-81B	Supp Chamber drain - press test inbd stop	Manual	Outside	Closed	NA	off torus drain line
X-213B	1601-89B	Supp Chamber drain - LT 1641-5B hi side inbd drain	Manual	Outside	Closed	NA	off 1641-5B hi side sensing line
X-213B	1699-5	Supp Chamber drain - PT 1641-14 drain	Manual	Outside	Closed	NA	
X-214	2399-40	HPCI exhaust vacuum breaker	MO Valve	Outside	Open	50	
X-214	2399-41	HPCI exhaust vacuum breaker	MO Valve	Outside	Open	50	
X-214	2399-68	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2399-40 and X-214
X-214	2399-70	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2399-40 & 64
X-214	2399-71	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2399-65 & 67
X-214	2399-72	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2399-64 & 66
X-214	2399-73	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2399-66 & 41
X-216	4799-159	Instrument air to suppression chamber	Check	Outside	Open	NA	

Table A-1
Primary Containment Isolation Devices (Unit 1)
(Page 13 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-216	4799-158	Instrument air to suppression chamber	Check	Inside	Open	NA	
X-216	4799-527	IA to suppression chamber - press test inbd stop	Manual	Outside	Closed	NA	tap between 4799-158 & 159
X-217	8801D	Torus oxygen analyzer sample	AO Valve	Outside	Open	10	
X-217	8802D	Torus oxygen analyzer sample	AO Valve	Outside	Open	10	
X-220	2301-45	HPCI turbine exhaust	Check	Outside	Closed	NA	
X-220	2301-74	HPCI turbine exhaust	Stop Check	Outside	Open	NA	
X-220	2399-74	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2301-74 & X-220
X-220	2301-74A	HPCI turbine exhaust - press test inbd stop	Manual	Outside	Closed	NA	tap on 2301-74
X-220	2301-41A	HPCI turbine exhaust - press test inbd stop	Manual	Outside	Closed	NA	tap on 2301-74 & 45
X-221	2301-34	HPCI turbine exhaust drain	Check	Outside	Closed	NA	
X-221	2301-71	HPCI turbine exhaust drain	Stop Check	Outside	Open	NA	
X-221	2301-41B	HPCI turbine exh. drain - press test inbd stop	Manual	Outside	Closed	NA	tap between 2301-34 & 71
X-222	1301-55	RCIC vacuum pump discharge to suppression chamber	Stop Check	Outside	Open	NA	
X-222	1301-40	RCIC vacuum pump discharge to suppression chamber	Check	Outside	Closed	NA	
X-222	1301-58B	RCIC vacuum pump discharge to suppression chamber - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1301-55 & 40
X-223A	1001-7A	RHR pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-223A	1001-7B	RHR pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-223A	1001-159A	'A' RHR Loop - torus suction inboard vent	Manual	Outside	Closed	NA	tap between 1001-7A & 7B
X-223A	RV-1001-125A capped line	'A' RHR Loop - pump 'A' suction RV discharge line	NA	Outside	Cap Installed	NA	between 1001-7A & torus
X-223A	RV-1001-125B capped line	'A' RHR Loop - pump 'B' suction RV discharge line	NA	Outside	Cap Installed	NA	between 1001-7B & torus
X-223B	1001-7C	RHR pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-223B	1001-7D	RHR pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-223B	1001-159B	'B' RHR Loop - torus suction inboard vent	Manual	Outside	Closed	NA	tap between 1001-7C & 7D
X-223B	RV-1001-125C capped line	'B' RHR Loop - pump 'C' suction RV discharge line	NA	Outside	Cap Installed	NA	between 1001-7C & torus

Table A-1
Primary Containment Isolation Devices (Unit 1)
(Page 14 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-223B	RV-1001-125D capped line	'A' RHR Loop - pump 'D' suction RV discharge line	NA	Outside	Cap Installed	NA	between 1001-7D & torus
X-224A	1402-3A	Core spray pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-224A	1402-21A	Core spray pump suction header vent valve	Manual	Outside	Closed	NA	tap between 1402-3A & torus
X-224B	1402-3B	Core spray pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-224B	1402-21B	Core spray pump suction header vent valve	Manual	Outside	Closed	NA	tap between 1402-3B & torus
X-225	2301-36	HPCI pump suction from suppression chamber	MO Valve	Outside	Closed	NA	
X-225	2301-37	HPCI pmp suct from Supp chamber - press test stop	Manual	Outside	Closed	NA	
X-225	2301-91	HPCI pmp suct from Supp chamber - vent valve	Manual	Outside	Closed	NA	
X-225	2399-107	HPCI pump from Supp chamber – vent valve	Manual	Outside	Closed	NA	Tap between 2301-36 and torus
X-226	1301-25	RCIC pump suction from suppression chamber	MO Valve	Outside	Closed	NA	
X-226	1301-28	RCIC pump suction from suppression chamber - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1301-25 & 27
X-227A	2499-3A	CAM/suppression chamber	SO Valve	Outside	Closed	NA	
X-227A	2499-4A	CAM/suppression chamber	SO Valve	Outside	Closed	NA	
X-227A	2499-9A	CAM/supp chamber - press test inbd stop	Manual	Outside	Closed	NA	tap between 2499-3A & 4A
X-227A	1601-91A	Suppression chamber LT 1641-5A low side vent	Manual	Outside	Closed	NA	
X-227B	2499-3B	CAM/suppression chamber	SO Valve	Outside	Closed	NA	
X-227B	2499-4B	CAM/suppression chamber	SO Valve	Outside	Closed	NA	
X-227B	2499-9B	CAM/supp chamber - press test inbd stop	Manual	Outside	Closed	NA	tap between 2499-3B & 4B
X-227B	1601-91B	Suppression chamber LT 1641-5B low side vent	Manual	Outside	Closed	NA	
--	1001-20	RHR discharge to radwaste	MO Valve	Outside	Closed	25	
--	1001-21	RHR discharge to radwaste	MO Valve	Outside	Closed	25	

Table A-2
Primary Containment Isolation Devices (Unit 2)
(Page 1 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-007A	0203-1A	Main steam line	AO Valve	Inside	Open	3≤T≤5	
X-007A	0203-2A	Main steam line	AO Valve	Outside	Open	3≤T≤5	
X-007A	0220-10A	Main steam line - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0203-1A & 2A
X-007B	0203-1B	Main steam line	AO Valve	Inside	Open	3≤T≤5	
X-007B	0203-2B	Main steam line	AO Valve	Outside	Open	3≤T≤5	
X-007B	0220-10B	Main steam line - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0203-1B & 2B
X-007C	0203-1C	Main steam line	AO Valve	Inside	Open	3≤T≤5	
X-007C	0203-2C	Main steam line	AO Valve	Outside	Open	3≤T≤5	
X-007C	0220-10C	Main steam line - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0203-1C & 2C
X-007D	0203-1D	Main steam line	AO Valve	Inside	Open	3≤T≤5	
X-007D	0203-2D	Main steam line	AO Valve	Outside	Open	3≤T≤5	
X-007D	0220-10D	Main steam line - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0203-1D & 2D
X-008	0220-1	Main steam line drain	MO Valve	Inside	Closed	35	
X-008	0220-2	Main steam line drain	MO Valve	Outside	Closed	35	
X-008	0220-5	Main steam line drain - pressure test inbd stop	Manual	Outside	Closed	NA	tap between 0220-1 & 2
X-009A	0220-62A	From reactor feedwater	Check	Outside	Open	NA	
X-009A	0220-58A	From reactor feedwater	Check	Inside	Open	NA	
X-009A	0220-86A	From Rx FW - local pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0220-58A & 62A
X-009A	3299-130	From Rx FW - LLRT inboard valve	Manual	Inside	Closed	NA	tap between 0220-58A & 62A
X-009A	220-115A	From Rx FW - inboard drain valve	Manual	Inside	Closed	NA	tap between 0220-58A & Rx
X-009A	3299-128	From Rx FW - inboard vent valve	Manual	Inside	Closed	NA	tap between 0220-58A & Rx
X-009B	0220-62B	From reactor feedwater	Check	Outside	Open	NA	
X-009B	0220-58B	From reactor feedwater	Check	Inside	Open	NA	
X-009B	0220-86B	From Rx FW - local pressure test inboard stop	Manual	Outside	Closed	NA	tap between 0220-58B & 62B
X-009B	3299-124	From Rx FW - LLRT inboard valve	Manual	Inside	Closed	NA	tap between 0220-58B & 62B
X-009B	0220-115B	From Rx FW - inboard drain valve	Manual	Inside	Closed	NA	tap between 0220-58B & Rx
X-009B	3299-122	From Rx FW - inboard vent valve	Manual	Inside	Closed	NA	tap between 0220-58B & Rx

Table A-2
Primary Containment Isolation Devices (Unit 2)
(Page 2 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-010	1301-16	RCIC turbine steam supply	MO Valve	Inside	Open	25	
X-010	1301-17	RCIC turbine steam supply	MO Valve	Outside	Open	25	
X-010	1301-18A	RCIC turbine steam supply - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1301-16 & 17
X-011	2301-4	HPCI turbine steam	MO Valve	Inside	Open	50	
X-011	2301-5	HPCI turbine steam	MO Valve	Outside	Open	63	
X-011	2301-16	HPCI turbine steam - pressure test inbd stop	Manual	Outside	Closed	NA	tap between X-11 & 2301-5
X-012	1001-47	RHR reactor shutdown cooling supply	MO Valve	Outside	Closed	40	
X-012	1001-50	RHR reactor shutdown cooling supply	MO Valve	Inside	Closed	40	
X-012	1099-178	shutdown cooling supply-inboard vent	Manual	Inside	Closed	NA	tap between 1001-50 & 47
X-012	1001-48	shutdown cooling supply - press test inbd stop	Manual	Outside	Closed	NA	tap between 1001-50 & 47
X-012	1001-156A	shutdown cooling supply - inboard vent	Manual	Outside	Closed	NA	tap between 1001-50 & 47
X-012	1001-156D	shutdown cooling supply - inboard vent	Manual	Outside	Closed	NA	tap between 1001-50 & 47
X-013A	1001-29A	RHR reactor LPCI / shutdown cooling injection	MO Valve	Outside	Closed	NA	
X-013A	1001-28A	RHR reactor LPCI / shutdown cooling injection	MO Valve	Outside	Open	NA	
X-013A	1001-68A	RHR reactor LPCI / shutdown cooling injection	AO Check	Inside	Closed	NA	
X-013A	1001-30A	'A' LPCI loop - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1001-29A & 68A
X-013B	1001-29B	RHR reactor LPCI / shutdown cooling injection	MO Valve	Outside	Closed	NA	
X-013B	1001-28B	RHR reactor LPCI / shutdown cooling injection	MO Valve	Outside	Open	NA	
X-013B	1001-68B	RHR reactor LPCI / shutdown cooling injection	AO Check	Inside	Closed	NA	
X-013B	1001-31B	'B' LPCI / SDC loop - press test inboard stop	Manual	Outside	Closed	NA	tap between 1001-29B & 68B
X-014	1201-2	Reactor water cleanup supply	MO Valve	Inside	Open	30	
X-014	1201-5	Reactor water cleanup supply	MO Valve	Outside	Open	38	
X-014	RV-1299-87	Reactor water cleanup supply	Relief	Inside	Closed	NA	
X-014	1201-121	RWCU supply - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1201-2 & 5
X-016A	1402-24A	Core spray to reactor	MO Valve	Outside	Open	NA	
X-016A	1402-25A	Core spray to reactor	MO Valve	Outside	Closed	NA	
X-016A	1402-9A	Core spray to reactor	Check	Inside	Closed	NA	
X-016A	1402-5A	Core Spray to Rx - pump dsch press test inbd stop	Manual	Outside	Closed	NA	tap between 1402-24A & 25A

Table A-2
Primary Containment Isolation Devices (Unit 2)
(Page 3 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-016A	1499-51	Core Spray to Rx-inboard vent	Manual	Outside	Closed	NA	tap between 1402-24A & 25A
X-016A	1402-33A	Core Spray to Rx - pump dsch press test inbd stop	Manual	Outside	Closed	NA	tap between 1402-25A & 9A
X-016B	1402-24B	Core spray to reactor	MO Valve	Outside	Open	NA	
X-016B	1402-25B	Core spray to reactor	MO Valve	Outside	Closed	NA	
X-016B	1402-9B	Core spray to reactor	Check	Inside	Closed	NA	
X-016B	1402-5B	Core Spray to Rx - pump dsch press test inbd stop	Manual	Outside	Closed	NA	tap between 1402-24B & 25B
X-016B	1402-33B	Core Spray to Rx - pump dsch press test inbd stop	Manual	Outside	Closed	NA	tap between 1402-25B & 9B
X-018	2001-3	Drywell floor drain discharge	AO Valve	Outside	Closed	20	
X-018	2001-4	Drywell floor drain discharge	AO Valve	Outside	Closed	20	
X-018	2099-394	DW floor drain discharge - press test inbd stop	Manual	Outside	Closed	NA	tap between 2001-3 & 4
X-019	2001-15	Drywell equipment drain discharge	AO Valve	Outside	Closed	20	
X-019	2001-16	Drywell equipment drain discharge	AO Valve	Outside	Closed	20	
X-019	2099-500	DW equip drain discharge - press test inbd stop	Manual	Outside	Closed	NA	tap between 2001-15 & 16
X-020	4399-45	Clean demineralizer water in	Manual	Outside	Closed	NA	
X-020	4399-46	Clean demineralizer water in	Check	Outside	Closed	NA	
X-020	4399-347	Clean demin water in - pressure test inbd stop	Manual	Outside	Closed	NA	tap between 4399-46 & X-20
X-020	4399-349	Clean demin water in - pressure test inbd stop	Manual	Outside	Closed	NA	tap between 4399-45 & 46
X-021	4699-47	Service air to drywell	Check	Outside	Closed	NA	
X-021	4699-46	Service air to drywell	Manual	Outside	Closed	NA	
X-021	4699-314	Service air to drywell - press test inbd stop	Manual	Outside	Closed	NA	tap between 4699-46 & 47
X-022	4799-155	Instrument air to drywell	Check	Inside	Open	NA	
X-022	4799-156	Instrument air to drywell	Check	Outside	Open	NA	
X-022	4799-157	Instrument air to drywell	Manual	Outside	Open	NA	
X-022	4799-518	Inst. air to drywell - local drop shutoff valve	Manual	Outside	Closed	NA	tap between 4799-155 & 156
X-023	3799-31	Rx building closed cooling water supply	Check	Inside	Open	NA	
X-023	3702	Rx building closed cooling water supply	MO Valve	Outside	Open	NA	
X-023	3799-136	RBCCW supply - press test inbd stop	Manual	Outside	Closed	NA	tap between 3799-31 & 3702
X-024	3703	Rx building closed cooling water return	MO Valve	Outside	Open	NA	

Table A-2
Primary Containment Isolation Devices (Unit 2)
(Page 4 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-024	3706	Rx building closed cooling water return	MO Valve	Inside	Open	NA	
X-024	3799-138	RBCCW return - press test inbd stop	Manual	Outside	Closed	NA	tap between 3703 & 3706
X-025	1601-23	Drywell main exhaust	AO Valve	Outside	Closed	10	
X-025	1601-62	Drywell main exhaust valve bypass (vent relief)	AO Valve	Outside	Closed	15	
X-025	1601-24	Main primary containment vent to Rx building exh	AO Valve	Outside	Closed	10	
X-025	1601-63	Primary Containment exhaust to SBGT system	AO Valve	Outside	Closed	10	
X-025	1601-72	Drywell main exh. / Main primary containment vent to Rx bldg exh - press test inbd stop	Manual	Outside	Closed	NA	tap between 1601-23 & 24
X-025	2599-64	ACAD to SBGT - DW PT 1641-12 test tap stop	Manual	Outside	Closed	NA	tap between X-25 & 2599-4A/B
X-025	1699-98	Hardened Containment Vent System (HCVS) Inlet	AO Valve	Outside	Closed	NA	Can only be opened using HCVS nitrogen supply – spring closed
X-026	1601-55	Drywell nitrogen purge inlet	AO Valve	Outside	Open	10	
X-026	1601-21	Drywell purge inlet	AO Valve	Outside	Closed	10	
X-026	1601-22	Drywell purge inlet	AO Valve	Outside	Closed	10	
X-026	1601-74	Drywell purge inlet - press test inbd stop	Manual	Outside	Closed	NA	tap between 1601-21 & 22
X-026	RV-8799-214	Nitrogen makeup	Relief	Outside	Closed	NA	
X-026	1601-57	Nitrogen makeup	MO Valve	Outside	Open	15	
X-026	1601-59	Nitrogen makeup to Drywell	AO Valve	Outside	Open	15	
X-026	8803	Oxygen analyzer return	AO Valve	Outside	Open	10	
X-026	8804	Oxygen analyzer return	AO Valve	Outside	Open	10	
X-026	1601-77	Oxygen analyzer return - DW air sample system pressure test stop	Manual	Outside	Closed	NA	tap between X-26 & 8804 / 1601-21
X-027C	PT 2-1624 test tap	Drywell pressure	NA	Outside	Cap Installed	NA	
X-027C	PT 2-1625 test tap	Drywell pressure	NA	Outside	Cap Installed	NA	
X-027C	DPT 2-1641-51 high side test tap	Drywell to Suppression Chamber differential pressure	NA	Outside	Cap Installed	NA	low side sensing line from X-205
X-030C	0220-451A 0220-452A	‘A’ RR Pump 1st stage seal pressure instrumentation/vent line	Check	2/Outside	Open	N/A	The check valve is held open by CRD flow

Table A-2
Primary Containment Isolation Devices (Unit 2)
(Page 5 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-030E	0220-176A	'A' RR Pmp DPT 0261-5A & DPIS 0261-35A,C,E,G low inboard vent	Manual	Outside	Closed	NA	tap between X-30E & 0220-13A
X-030F	0220-174A	'A' RR Pmp DPT 0261-5A & DPIS 0261-35A,C,E,G high inboard vent	Manual	Outside	Closed	NA	tap between X-30F & 0220-14A
X-031C	0220-451B 0220-452B	'B' RR Pump 1st stage seal pressure instrumentation/vent line	Check	2/Outside	Open	N/A	The check valve is held open by CRD flow
X-031E	0220-176B	'B' RR Pmp DPT 0261-5B & DPIS 0261-35B,D,F,H low inboard vent	Manual	Outside	Closed	NA	tap between X-31E & 0220-13B
X-031F	0220-174B	'B' RR Pmp DPT 0261-5B & DPIS 0261-35B,D,F,H high inboard vent	Manual	Outside	Closed	NA	tap between X-31F & 0220-14B
X-032	4720	Drywell pneumatic suction X-32D	AO Valve	Outside	Open	10	
X-032	4721	Drywell pneumatic suction X-32D	AO Valve	Outside	Open	10	
X-033	2499-1A	CAM/drywell (position E)	SO Valve	Outside	Closed	NA	
X-033	2499-2A	CAM/drywell (position E)	SO Valve	Outside	Closed	NA	
X-033	2499-7A	CAM/drywell (pos. E) - press test inbd stop	Manual	Outside	Closed	NA	tap between 2499-1A & 2A
X-033	2499-22A	CAM return (position D)	Check	Outside	Closed	NA	
X-033	2499-25A	CAM return (pos. D) - smpl outlet press test inbd stop	Manual	Outside	Closed	NA	tap between X-033 & 2499-22A
X-035A	0743	Traversing in-core probe purge	Check	Outside	Closed	NA	
X-035B	0737-1C	Traversing in-core probe	SO Valve	Outside	Closed	NA	
X-035B	0737-2C	Traversing in-core probe	Shear	Outside	Open	NA	
X-035C	0737-1B	Traversing in-core probe	SO Valve	Outside	Closed	NA	
X-035C	0737-2B	Traversing in-core probe	Shear	Outside	Open	NA	
X-035D	0737-1D	Traversing in-core probe	SO Valve	Outside	Closed	NA	
X-035D	0737-2D	Traversing in-core probe	Shear	Outside	Open	NA	
X-035E	0737-1F	Traversing in-core probe	SO Valve	Outside	Closed	NA	
X-035E	0737-2F	Traversing in-core probe	Shear	Outside	Open	NA	
X-035F	0737-1E	Traversing in-core probe	SO Valve	Outside	Closed	NA	
X-035F	0737-2E	Traversing in-core probe	Shear	Outside	Open	NA	
X-037	2499-22B	CAM return (pos. C)	Check	Outside	Closed	NA	
X-037	2499-25B	CAM return (pos. C) - smpl outlet pressure test inboard stop	Manual	Outside	Closed	NA	tap between X-037 & 2499-22B

Table A-2
Primary Containment Isolation Devices (Unit 2)
(Page 6 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-039A	1001-26A	RHR - containment spray	MO Valve	Outside	Closed	NA	
X-039A	1001-23A	RHR - containment spray	MO Valve	Outside	Closed	NA	
X-039A	1001-197	RHR containment spray - pressure test stop	Manual	Outside	Closed	NA	tap between 1001-26A & 23A
X-039A	1099-166	RHR - containment spray	Manual	Outside	Closed	NA	tap between 1001-26A & 23A
X-039A	1001-26A bonnet test tap	RHR - containment spray	NA	Outside	Cap Installed	NA	bonnet test tap cap for 1001-26A
X-039A	1001-25A	'A' Containment Spray - loop inboard drain	Manual	Outside	Closed	NA	tap between 1001-23A & 26A
X-039B	1001-26B	RHR - containment spray	MO Valve	Outside	Closed	NA	
X-039B	1001-23B	RHR - containment spray	MO Valve	Outside	Closed	NA	
X-039B	1001-26B bonnet test tap	RHR - containment spray	NA	Outside	Cap Installed	NA	bonnet test tap cap for 1001-26B
X-039B	1001-25B	'B' Containment Spray - loop inboard drain	Manual	Outside	Closed	NA	tap between 1001-23B & 26B
X-039B	1001-196	'B' Containment Spray - loop pressure test	Manual	Outside	Closed	NA	tap between 1001-23B & 26B
X-039B	Blind Flange	RHR DW spray blind flange	NA	Outside	Installed	NA	between 1001-23B & 26B
X-041	0220-44	Reactor water sample	AO Valve	Inside	Open	5	
X-041	0220-45	Reactor water sample	AO Valve	Outside	Open	5	
X-041	0220-43	Reactor water sample - press test inbd stop	Manual	Outside	Closed	NA	tap between 0220-44 & 45
X-043	8800-02B	Particulate sample lines (line B)	Manual	Outside	Closed	NA	
X-043	8800-03B	Particulate sample lines (line B)	Manual	Outside	Closed	NA	
X-043	8800-02C	Particulate sample lines (line C)	Manual	Outside	Closed	NA	
X-043	8800-03C	Particulate sample lines (line C)	Manual	Outside	Closed	NA	
X-043	8800-02D	Particulate sample lines (line D)	Manual	Outside	Closed	NA	
X-043	8800-03D	Particulate sample lines (line D)	Manual	Outside	Closed	NA	
X-043	8800-02E	Particulate sample lines (line E)	Manual	Outside	Closed	NA	
X-043	8800-03E	Particulate sample lines (line E)	Manual	Outside	Closed	NA	
X-043	8800-02F	Particulate sample lines (line F)	Manual	Outside	Closed	NA	
X-043	8800-03F	Particulate sample lines (line F)	Manual	Outside	Closed	NA	
X-043	8800-02G	Particulate sample lines (line G)	Manual	Outside	Closed	NA	
X-043	8800-03G	Particulate sample lines (line G)	Manual	Outside	Closed	NA	

Table A-2
Primary Containment Isolation Devices (Unit 2)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-043	8800-02H	Particulate sample lines (line H)	Manual	Outside	Closed	NA	
X-043	8800-03H	Particulate sample lines (line H)	Manual	Outside	Closed	NA	
X-043	8800-02I	Particulate sample lines (line I)	Manual	Outside	Closed	NA	
X-043	8800-03I	Particulate sample lines (line I)	Manual	Outside	Closed	NA	
X-043	8800-02J	Particulate sample lines (line J)	Manual	Outside	Closed	NA	
X-043	8800-03J	Particulate sample lines (line J)	Manual	Outside	Closed	NA	
X-043	8800-02K	Particulate sample lines (line K)	Manual	Outside	Closed	NA	
X-043	8800-03K	Particulate sample lines (line K)	Manual	Outside	Closed	NA	
X-043	8800-02L	Particulate sample lines (line L)	Manual	Outside	Closed	NA	
X-043	8800-03L	Particulate sample lines (line L)	Manual	Outside	Closed	NA	
X-043	8800-02M	Particulate sample lines (line M)	Manual	Outside	Closed	NA	
X-043	8800-03M	Particulate sample lines (line M)	Manual	Outside	Closed	NA	
X-043	8800-02N	Particulate sample lines (line N)	Manual	Outside	Closed	NA	
X-043	8800-03N	Particulate sample lines (line N)	Manual	Outside	Closed	NA	
X-043	8800-02O	Particulate sample lines (line O)	Manual	Outside	Closed	NA	
X-043	8800-03O	Particulate sample lines (line O)	Manual	Outside	Closed	NA	
X-043	8800-02P	Particulate sample lines (line P)	Manual	Outside	Closed	NA	
X-043	8800-03P	Particulate sample lines (line P)	Manual	Outside	Closed	NA	
X-043	8800-02Q	Particulate sample lines (line Q)	Manual	Outside	Closed	NA	
X-043	8800-03Q	Particulate sample lines (line Q)	Manual	Outside	Closed	NA	
X-043	8800-02R	Particulate sample lines (line R)	Manual	Outside	Closed	NA	
X-043	8800-03R	Particulate sample lines (line R)	Manual	Outside	Closed	NA	
X-043	8800-02S	Particulate sample lines (line S)	Manual	Outside	Closed	NA	
X-043	8800-03S	Particulate sample lines (line S)	Manual	Outside	Closed	NA	
X-043	8800-02T	Particulate sample lines (line T)	Manual	Outside	Closed	NA	
X-043	8800-03T	Particulate sample lines (line T)	Manual	Outside	Closed	NA	
X-043	8800-02U	Particulate sample lines (line U)	Manual	Outside	Closed	NA	
X-043	8800-03U	Particulate sample lines (line U)	Manual	Outside	Closed	NA	

Table A-2
Primary Containment Isolation Devices (Unit 2)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-043	8800-02V	Particulate sample lines (line V)	Manual	Outside	Closed	NA	
X-043	8800-03V	Particulate sample lines (line V)	Manual	Outside	Closed	NA	
X-043	8801A	Drywell oxygen analyzer sample (line A)	AO Valve	Outside	Open	10	
X-043	8802A	Drywell oxygen analyzer sample (line A)	AO Valve	Outside	Open	10	
X-043	8801B	Drywell oxygen analyzer sample (line B)	AO Valve	Outside	Open	10	
X-043	8802B	Drywell oxygen analyzer sample (line B)	AO Valve	Outside	Open	10	
X-043	8801C	Drywell oxygen analyzer sample (line C)	AO Valve	Outside	Open	10	
X-043	8802C	Drywell oxygen analyzer sample (line C)	AO Valve	Outside	Open	10	
X-044	4799-176	HVAC instrument penetration	Manual	Outside	Closed	NA	capped line
X-044	4799-479A	HVAC instrument penetration (line A)	Manual	Outside	Closed	NA	capped line
X-044	4799-479B	HVAC instrument penetration (line B)	Manual	Outside	Closed	NA	capped line
X-044	4799-479C	HVAC instrument penetration (line C)	Manual	Outside	Closed	NA	capped line
X-044	4799-479D	HVAC instrument penetration (line D)	Manual	Outside	Closed	NA	capped line
X-044	4799-479E	HVAC instrument penetration (line E)	Manual	Outside	Closed	NA	capped line
X-044	4799-479F	HVAC instrument penetration (line F)	Manual	Outside	Closed	NA	capped line
X-044	4799-479G	HVAC instrument penetration (line G)	Manual	Outside	Closed	NA	capped line
X-044	4799-479H	HVAC instrument penetration (line H)	Manual	Outside	Closed	NA	capped line
X-044	4799-479J	HVAC instrument penetration (line J)	Manual	Outside	Closed	NA	capped line
X-044	4799-479K	HVAC instrument penetration (line K)	Manual	Outside	Closed	NA	capped line
X-044	4799-479L	HVAC instrument penetration (line L)	Manual	Outside	Closed	NA	capped line
X-044	4799-479M	HVAC instrument penetration (line M)	Manual	Outside	Closed	NA	capped line
X-044	4799-479N	HVAC instrument penetration (line N)	Manual	Outside	Closed	NA	capped line
X-044	4799-479P	HVAC instrument penetration (line P)	Manual	Outside	Closed	NA	capped line
X-044	4799-479Q	HVAC instrument penetration (line Q)	Manual	Outside	Closed	NA	capped line
X-044	4799-479R	HVAC instrument penetration (line R)	Manual	Outside	Closed	NA	capped line
X-044	4799-479S	HVAC instrument penetration (line S)	Manual	Outside	Closed	NA	capped line
X-044	4799-479T	HVAC instrument penetration (line T)	Manual	Outside	Closed	NA	capped line
X-044	4799-479U	HVAC instrument penetration (line U)	Manual	Outside	Closed	NA	capped line

Table A-2
Primary Containment Isolation Devices (Unit 2)
(Page 9 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-044	4799-479V	HVAC instrument penetration (line V)	Manual	Outside	Closed	NA	capped line
X-044	4799-479W	HVAC instrument penetration (line W)	Manual	Outside	Closed	NA	capped line
X-044	4799-479X	HVAC instrument penetration (line X)	Manual	Outside	Closed	NA	capped line
X-044	4799-479Y	HVAC instrument penetration (line Y)	Manual	Outside	Closed	NA	capped line
X-044	4799-479Z	HVAC instrument penetration (line Z)	Manual	Outside	Closed	NA	capped line
X-047	1101-16	Standby liquid control	Check	Outside	Closed	NA	
X-047	1101-15	Standby liquid control	Check	Inside	Closed	NA	
X-047	1101-34	SBLC - injection line pressure tap inboard stop	Manual	Outside	Closed	NA	tap between 1101-15 & 16
X-100D	2499-1B	CAM/drywell (position F)	SO Valve	Outside	Closed	NA	
X-100D	2499-2B	CAM/drywell (position F)	SO Valve	Outside	Closed	NA	
X-100D	2499-7B	CAM/drywell (pos. F) - press test inbd stop	Manual	Outside	Closed	NA	tap between 2499-1B & 2B
X-100D	4799-353	SRM/IRM purge	Check	Outside	Closed	NA	
X-100D	4799-354	SRM/IRM purge	Check	Outside	Closed	NA	
X-100D	4799-480A	Instrumentation Lines (line A)	Manual	Outside	Closed	NA	capped line
X-100D	4799-480B	Instrumentation Lines (line B)	Manual	Outside	Closed	NA	capped line
X-100D	4799-480C	Instrumentation Lines (line C)	Manual	Outside	Closed	NA	capped line
X-104E	4799-477A	Instrumentation Lines (line A)	Manual	Outside	Closed	NA	capped line
X-104E	4799-477B	Instrumentation Lines (line B)	Manual	Outside	Closed	NA	capped line
X-104E	4799-477C	Instrumentation Lines (line C)	Manual	Outside	Closed	NA	capped line
X-104E	4799-477D	Instrumentation Lines (line D)	Manual	Outside	Closed	NA	capped line
X-104E	4799-477E	Instrumentation Lines (line E)	Manual	Outside	Closed	NA	capped line
X-104E	4799-477F	Instrumentation Lines (line F)	Manual	Outside	Closed	NA	capped line
X-104E	4799-477G	Instrumentation Lines (line G)	Manual	Outside	Closed	NA	capped line
X-108	0263-944A	RVLIS Backfill (line 2-2334A)	Check	Outside	Open	NA	
X-108	0263-945A	RVLIS Backfill (line 2-2334A)	Check	Outside	Open	NA	
X-108	0263-947A	RVLIS Backfill (line 2-2335A)	Check	Outside	Open	NA	
X-108	0263-948A	RVLIS Backfill (line 2-2335A)	Check	Outside	Open	NA	
X-108	0263-960A	RVLIS Backfill - test valve	Manual	Outside	Closed	NA	tap between 0263-944A & X-108

Table A-2
Primary Containment Isolation Devices (Unit 2)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-108	0263-958A	RVLIS Backfill - vent valve	Manual	Outside	Closed	NA	tap between 0263-944A & X-108
X-108	0263-955A	RVLIS Backfill - test valve	Manual	Outside	Closed	NA	tap between 0263-947A & X-108
X-108	0263-953A	RVLIS Backfill - vent valve	Manual	Outside	Closed	NA	tap between 0263-947A & X-108
X-109	0263-944B	RVLIS Backfill (line 2-2334B)	Check	Outside	Open	NA	
X-109	0263-945B	RVLIS Backfill (line 2-2334B)	Check	Outside	Open	NA	
X-109	0263-947B	RVLIS Backfill (line 2-2335B)	Check	Outside	Open	NA	
X-109	0263-948B	RVLIS Backfill (line 2-2335B)	Check	Outside	Open	NA	
X-109	0263-960B	RVLIS Backfill - test valve	Manual	Outside	Closed	NA	tap between 0263-944B & X-109
X-109	0263-958B	RVLIS Backfill - vent valve	Manual	Outside	Closed	NA	tap between 0263-944B & X-109
X-109	0263-955B	RVLIS Backfill - test valve	Manual	Outside	Closed	NA	tap between 0263-947B & X-109
X-109	0263-953B	RVLIS Backfill - vent valve	Manual	Outside	Closed	NA	tap between 0263-947B & X-109
X-203A	1601-60	Suppression chamber main exhaust	AO Valve	Outside	Closed	10	
X-203A	1601-61	Suppression chamber main exhaust valve bypass	AO Valve	Outside	Closed	15	
X-203A	1601-24	Main primary containment vent to Rx building exh	AO Valve	Outside	Closed	10	
X-203A	1601-63	Primary Containment exhaust to SBGT system	AO Valve	Outside	Closed	10	
X-203A	1601-72	Suppression chamber main exhaust / Main primary containment vent to Rx bldg exh - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1601-60/61 & 24
X-203A	1699-98	Hardened Containment Vent System (HCVS) Inlet	AO Valve	Outside	Closed	NA	Can only be opened using HCVS nitrogen supply – spring closed
X-205	1601-20A	Vacuum breaker secondary containment to suppression chamber	AO Valve	Outside	Closed	NA	
X-205	1601-31A	Vacuum breaker secondary containment to suppression chamber	Check	Outside	Closed	NA	
X-205	1601-73A	Vac. breaker secondary containment to suppression chamber - pressure test inbd stop	Manual	Outside	Closed	NA	tap between 1601-20A & 31A
X-205	1601-20B	Vacuum breaker secondary containment to suppression chamber	AO Valve	Outside	Closed	NA	
X-205	1601-31B	Vacuum breaker secondary containment to suppression chamber	Check	Outside	Closed	NA	

Table A-2
Primary Containment Isolation Devices (Unit 2)
(Page 11 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-205	1601-73B	Vac. breaker secondary containment to suppression chamber - pressure test inbd stop	Manual	Outside	Closed	NA	tap between 1601-20B & 31B
X-205	1601-56	Suppression chamber purge inlet	AO Valve	Outside	Open	10	
X-205	1601-58	Nitrogen makeup to suppression chamber	AO Valve	Outside	Closed	15	
X-205	1601-91B	Suppression chamber LT 1641-5B low side vent	Manual	Outside	Closed	NA	
X-205	DPT 2-1641-51 low side test tap	Drywell to Suppression Chamber differential pressure	NA	Outside	Cap Installed	NA	hi side sensing line from X-027C
X-205	DPT 2-1622A test tap	Suppression Chamber to Reactor Building differential pressure	NA	Outside	Cap Installed	NA	
X-205	DPT 2-1622B test tap	Suppression Chamber to Reactor Building differential pressure	NA	Outside	Cap Installed	NA	
X-205	PT 2-1623 test tap	Suppression Chamber pressure	NA	Outside	Cap Installed	NA	
X-206A	1601-100	Suppression chamber LG 1602-10 upper shutoff	Manual	Outside	Closed	NA	
X-206A	1699-17	Suppression chamber LT 2-1626 upper shutoff	Manual	Outside	Closed	NA	
X-206A	1699-42	Suppression Chamber level indicator drain pot drain valve	Manual	Outside	Closed	NA	
X-206A	PT 2-1602-8 test tap	Suppression Chamber pressure	NA	Outside	Cap Installed	NA	
X-206A	LT 2-1602-9 low side test tap	Suppression Chamber level	NA	Outside	Cap Installed	NA	
X-206B	1699-16	Suppression chamber level instrumentation drain	Manual	Outside	Closed	NA	
X-206B	1601-101	Suppression chamber LG 1602-10 lower shutoff	Manual	Outside	Closed	NA	
X-206B	1699-15	Suppression chamber LT 2-1626 lower shutoff	Manual	Outside	Closed	NA	
X-206B	1699-19	Suppression chamber water reservoir fill tap	Manual	Outside	Closed	NA	
X-206B	LT 2-1602-9 high side test tap	Suppression Chamber level	NA	Outside	Cap Installed	NA	
X-206C	2399-35	Suppression chamber LS 2351A & B high side drain	Manual	Outside	Closed	NA	
X-206C	2399-38A	Suppression chamber LS 2351A drain	Manual	Outside	Closed	NA	
X-206C	2399-38B	Suppression chamber LS 2351B drain	Manual	Outside	Closed	NA	
X-210A	1402-4A	Core spray test to suppression pool	MO Valve	Outside	Closed	NA	
X-210A	1402-4B	Core spray test to suppression pool	MO Valve	Outside	Closed	NA	

Table A-2
Primary Containment Isolation Devices (Unit 2)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-210A	1001-36A	RHR test line to suppression pool	MO Valve	Outside	Closed	NA	
X-210A	2301-14	HPCI min flow bypass	MO Valve	Outside	Closed	NA	
X-210A	1301-47	RCIC min flow bypass	Check	Outside	Closed	NA	
X-210A	1402-38A	Core spray min bypass	MO Valve	Outside	Closed	NA	
X-210A	1402-38B	Core spray min bypass	MO Valve	Outside	Closed	NA	
X-210A	1001-18A	RHR min flow bypass	MO Valve	Outside	Open	NA	
X-210B	1001-36B	RHR test line to suppression pool	MO Valve	Outside	Closed	NA	
X-210B	1001-18B	RHR min flow bypass	MO Valve	Outside	Open	NA	
X-211A	1001-34A	RHR - suppression pool test return	MO Valve	Outside	Closed	NA	
X-211A	1001-37A	RHR to suppression spray header	MO Valve	Outside	Closed	NA	
X-211B	1001-34B	RHR-suppression pool test return	MO Valve	Outside	Closed	NA	
X-211B	1001-37B	RHR to suppression spray header	MO Valve	Outside	Closed	NA	
X-212	1301-41	RCIC turbine exhaust	Check	Outside	Closed	NA	
X-212	1301-64	RCIC turbine exhaust	Stop Check	Outside	Open	NA	
X-212	1399-105	RCIC turbine exhaust - press test inbd stop	Manual	Outside	Closed	NA	tap on 1301-64
X-212	1399-58A	RCIC turbine exhaust - press test inbd stop	Manual	Outside	Closed	NA	tap between 1301-41 & 64
X-213A	1601-80B	Supp Chamber drain - inboard drain valve	Manual	Outside	Closed	NA	
X-213A	1601-81B	Supp Chamber drain - press test inbd stop	Manual	Outside	Closed	NA	off torus drain line
X-213A	1601-89A	Supp Chamber drain - LT 1641-5A hi side inbd drain	Manual	Outside	Closed	NA	off 1641-5A hi side sensing line
X-213B	1601-83	Supp Chamber drain - press test inbd stop	Manual	Outside	Closed	NA	
X-213B	1601-89B	Supp Chamber drain - LT 1641-5B hi side inbd drain	Manual	Outside	Closed	NA	off 1641-5B hi side sensing line
X-213B	1699-5	Supp Chamber drain - PT 1641-14 drain	Manual	Outside	Closed	NA	
X-216	4799-159	Instrument air to suppression chamber	Check	Outside	Open	NA	
X-216	4799-158	Instrument air to suppression chamber	Check	Inside	Open	NA	
X-216	4799-527	IA to suppression chamber - press test inbd stop	Manual	Outside	Closed	NA	tap between 4799-158 & 159
X-217	8801D	Torus oxygen analyzer sample	AO Valve	Outside	Open	10	
X-217	8802D	Torus oxygen analyzer sample	AO Valve	Outside	Open	10	
X-220	2301-45	HPCI turbine exhaust	Check	Outside	Closed	NA	

Table A-2
Primary Containment Isolation Devices (Unit 2)
(Page 13 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-220	2301-74	HPCI turbine exhaust	Stop Check	Outside	Open	NA	
X-220	2399-74	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2301-74 & X-220
X-220	2301-74A	HPCI turbine exhaust - press test inbd stop	Manual	Outside	Closed	NA	tap on 2301-74
X-220	2301-41A	HPCI turbine exhaust - press test inbd stop	Manual	Outside	Closed	NA	tap on 2301-74 & 45
X-221	2301-34	HPCI turbine exhaust drain	Check	Outside	Closed	NA	
X-221	2301-71	HPCI turbine exhaust drain	Stop Check	Outside	Open	NA	
X-221	2301-41B	HPCI turbine exh. drain - press test inbd stop	Manual	Outside	Closed	NA	tap between 2301-34 & 71
X-221	2399-55	HPCI turbine exh. drain - press test inbd stop	Manual	Outside	Closed	NA	tap between 2301-71 & X-221
X-222	1301-55	RCIC vacuum pump discharge to suppression chamber	Stop Check	Outside	Open	NA	
X-222	1301-40	RCIC vacuum pump discharge to suppression chamber	Check	Outside	Closed	NA	
X-222	1301-58B	RCIC vacuum pump discharge to suppression chamber - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1301-55 & 40
X-222	1399-106	RCIC vacuum pump discharge to suppression chamber - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1301-55 & X-222
X-223A	1001-7A	RHR pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-223A	1001-7B	RHR pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-223A	1001-159A	'A' RHR Loop - torus suction inboard vent	Manual	Outside	Closed	NA	tap between 1001-7A & 7B
X-223A	RV-1001-125A capped line	'A' RHR Loop - pump 'A' suction RV discharge line	NA	Outside	Cap Installed	NA	between 1001-7A & torus
X-223A	RV-1001-125B capped line	'A' RHR Loop - pump 'B' suction RV discharge line	NA	Outside	Cap Installed	NA	between 1001-7B & torus
X-223B	1001-7C	RHR pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-223B	1001-7D	RHR pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-223B	1001-159B	'B' RHR Loop - torus suction inboard vent	Manual	Outside	Closed	NA	tap between 1001-7C & 7D
X-223B	RV-1001-125C capped line	'B' RHR Loop - pump 'C' suction RV discharge line	NA	Outside	Cap Installed	NA	between 1001-7C & torus
X-223B	RV-1001-125D capped line	'A' RHR Loop - pump 'D' suction RV discharge line	NA	Outside	Cap Installed	NA	between 1001-7D & torus
X-224A	1402-3A	Core spray pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-224A	1402-21A	Core spray pump suction header vent valve	Manual	Outside	Closed	NA	tap between 1402-3A & torus

Table A-2
Primary Containment Isolation Devices (Unit 2)
(Page 14 of 14)

Containment Penetration Number	Valve Part Number	Line Isolated	Valve Type	Location Ref. to Containment	Normal Status	Max. Operating Time (sec)	Comments
X-224B	1402-3B	Core spray pump suction from suppression chamber	MO Valve	Outside	Open	NA	
X-224B	1402-21B	Core spray pump suction header vent valve	Manual	Outside	Closed	NA	tap between 1402-3B & torus
X-225	2301-36	HPCI pump suction from suppression chamber	MO Valve	Outside	Closed	NA	
X-225	2301-37	HPCI pmp suct from Supp chamber - press test stop	Manual	Outside	Closed	NA	
X-225	2399-107	HPCI pump suct from Supp chamber - vent valve	Manual	Outside	Closed	NA	tap between 2301-36 and torus
X-226	1301-25	RCIC pump suction from suppression chamber	MO Valve	Outside	Closed	NA	
X-226	1301-28	RCIC pump suction from suppression chamber - pressure test inboard stop	Manual	Outside	Closed	NA	tap between 1301-25 & 27
X-227A	2499-3A	CAM/suppression chamber	SO Valve	Outside	Closed	NA	
X-227A	2499-4A	CAM/suppression chamber	SO Valve	Outside	Closed	NA	
X-227A	2499-9A	CAM/supp chamber - press test inbd stop	Manual	Outside	Closed	NA	tap between 2499-3A & 4A
X-227A	1601-91A	Suppression chamber LT 1641-5A low side vent	Manual	Outside	Closed	NA	
X-227B	2499-3B	CAM/suppression chamber	SO Valve	Outside	Closed	NA	
X-227B	2499-4B	CAM/suppression chamber	SO Valve	Outside	Closed	NA	
X-227B	2499-9B	CAM/supp chamber - press test inbd stop	Manual	Outside	Closed	NA	tap between 2499-3B & 4B
X-227B	1601-91B	Suppression chamber LT 1641-5B low side vent	Manual	Outside	Closed	NA	
X-229	2399-40	HPCI exhaust vacuum breaker	MO Valve	Outside	Open	50	
X-229	2399-41	HPCI exhaust vacuum breaker	MO Valve	Outside	Open	50	
X-229	2399-68	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2399-40 and X-229
X-229	2399-70	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2399-40 & 64
X-229	2399-71	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2399-65 & 67
X-229	2399-72	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2399-64 & 66
X-229	2399-73	HPCI exhaust vac. breaker - press test inbd stop	Manual	Outside	Closed	NA	tap between 2399-66 & 41
--	1001-20	RHR discharge to radwaste	MO Valve	Outside	Closed	25	
--	1001-21	RHR discharge to radwaste	MO Valve	Outside	Closed	25	

APPENDIX B

SECONDARY CONTAINMENT ISOLATION VALVES

Table B-1 (page 1 of 2)
Secondary Containment Isolation Valves

VALVE	ISOLATION TIME (seconds)
1. [Deleted]	NA
2. [Deleted]	NA
3. Unit 1 RWCU Precoat Outlet to Radwaste Stop Valve RM 1-1279-60	NA
4. Unit 1 RWCU Precoat tank to Radwaste Drain Valve 1-1279-61	NA
5. Fire Water to Reactor Building Strainer Drain Valve 1-4199-43	NA
6. Fire Header to Containment Spray Header Cross-tie Stop Valve 1-1499-127	NA
7. Unit 1 Primary Containment Integrated Leak Rate Test Flange Connection 1-4199	NA
8. ‘2A’ RWCU Filter Demin to Radwaste Drain Valve RM 2-1279-21A	NA
9. ‘2B’ RWCU Filter Demin to Radwaste Drain Valve RM 2-1279-21B	NA
10. Unit 2 RWCU Precoat Outlet to Radwaste Stop Valve RM 2-1279-60	NA
11. Unit 2 RWCU Precoat Tank to Radwaste Drain Valve 2-1279-61	NA
12. Fire Header Strainer to Reactor Building Flush Valve 2-4199-43	NA
13. Fire Header Stop Valve 2-4199-127	NA
14. Fire Header Stop Valve 2-4199-170	NA
15. Unit 2 Primary Containment Integrated Leak Rate Test Flange Connection 2-4199	NA
16. Reactor Building Ventilation Inlet Isolation Damper 1- 5741A	60
17. Reactor Building Ventilation Inlet Isolation Damper 1-5741B	60
18. Reactor Building Ventilation Exhaust Isolation Damper 1-5742A	60
19. Reactor Building Ventilation Exhaust Isolation Damper 1-5742B	60
20. Reactor Building Ventilation Inlet Isolation Damper 2-5741A	60
21. Reactor Building Ventilation Inlet Isolation Damper 2-5741B	60
22. Reactor Building Ventilation Exhaust Isolation Damper 2-5742A	60
23. Reactor Building Ventilation Exhaust Isolation Damper 2-5742B	60
24. [Deleted]	NA
25. [Deleted]	NA
26. [Deleted]	NA
27. HCVS Vent Line Rupture Disc 1-1603-2	NA

Table B-1 (page 2 of 2)
Secondary Containment Isolation Valves

VALVE	ISOLATION TIME (seconds)
28. HCVS Vent Line Rupture Disc 2-1603-2	NA
29. HCVS Vent Line Drn Vlv 1-1603-30	NA
30. HCVS Vent Line Drn Vlv 2-1603-30	NA
31. HCVS Nitrogen Isol Vlv to Torus Vent Vlv 1-1604-14	NA
32. HCVS Nitrogen Isol Vlv to Torus Vent Vlv 2-1604-14	NA
33. HCVS Argon Supply 3-Way Vlv 1-1605-14	NA
34. HCVS Argon Supply 3-Way Vlv 2-1605-14	NA
35. HCVS PCI Vlv Nitrogen Isol Vlv 1-1604-24	NA
36. HCVS PCI Vlv Nitrogen Isol Vlv 2-1604-24	NA

TABLE OF CONTENTS

A. PURPOSE

A.1 Objective

The purpose of the SFDP is to enusre that when Technical Specification LCO 3.0.6 is used to preclude performing the Conditions and Actions for inoperable SUPPORTED SYSTEMS:

- A Loss of Safety Function does not go undetected,
- The plant will be placed in a safe condition if a Loss of Safety Function is determined to exist, and
- A supported SYSTEM(S) Completion Time will not be inappropriately extended.

B. REFERENCES

B.1 Technical Specification (TS) 3.0.6.

B.2 TS 5.5.11, "Safety Function Determination Program (SFDP)"

C. DEFINITIONS

C.1 **SAFETY FUNCTION** –

An accident mitigation feature required by NRC regulation, plant design or Technical Specifications normally composed of two trains of SUPPORT and SUPPORTED equipment.

C.2 **LOSS OF SAFETY FUNCTION (LOSF)** –

A LOSF exists when, assuming no concurrent single failure and assuming no concurrent loss of offsite power or loss of onsite diesel generator(s), a safety function assumed in the accident analysis cannot be performed.
(SEE ATTACHMENT 1.0)

C.3 **SUPPORT SYSTEM** –

A SYSTEM(S) that is needed by another TS LCO required SYSTEM(S) to perform a safety function.

C.4 **SUPPORTED SYSTEM –**

A SYSTEM, required by the TS, which requires a SUPPORT SYSTEM to ensure its safety function can be performed. Process parameters or operating limits do not comprise SUPPORTED SYSTEM(S) for the purposes of implementing TS LCO 3.0.6.

C.5 **MAXIMUM OUT OF SERVICE TIME –**

A SUPPORTED SYSTEM(S) made inoperable by the SUPPORT SYSTEM(S) inoperability shall be restored to OPERABLE status within the Maximum Out Of Service Time (MOST). The MOST is the Completion Time specified in the Technical Specifications for restoring the first inoperable SUPPORT SYSTEM(S) to OPERABLE status plus the time specified in the TS for restoring the SUPPORTED SYSTEM(S) to OPERABLE status. (SEE ATTACHMENT 2 – Completion Time Extensions)

The inoperability of the SUPPORTED SYSTEM(S) must only be directly attributed to its associated SUPPORT SYSTEM(S) being inoperable and the SUPPORT SYSTEM(S) Required Actions not specifically requiring entry into the SUPPORTED SYSTEM(S) Conditions and Required Actions.

D. LIMITATIONS

D.1 Reporting Requirements will be done in accordance with the Reportability Manual.

D.2 Changes to this Program shall be performed in accordance with the TRM Change Control Program.

D.3 The Shift Manager is responsible for implementing the Safety Function Determination Program.

E. PROCEDURE

E.1 LCO 3.0.6 REQUIREMENTS

E.1.1 TS LCO 3.0.2 states that upon discovery of a failure to meet an TS LCO, the Required Actions of the associated Conditions shall be met, except as provided in TS LCO 3.0.5 and TS LCO 3.0.6.

E.1.2 TS LCO 3.0.6 provides an exception to TS LCO 3.0.2 for SUPPORT SYSTEM(S) by not requiring the Conditions and Required Actions for the SUPPORTED SYSTEM(S) to be performed when the failure to meet an TS LCO is solely due to a SUPPORT SYSTEM(S) LCO not being met. In this situation, although the SUPPORTED SYSTEM(S) is determined to be inoperable as defined in the Technical Specifications, LCO 3.0.6 requires only the ACTIONS of the SUPPORT SYSTEM(S) to be performed. The Conditions and Required Actions for the SUPPORTED SYSTEM(S) are not required to be performed (i.e., cascading to the SUPPORTED SYSTEM(S)) per TS LCO 3.0.6.

E.1.3 There are two types of SUPPORT SYSTEM(S) that must be considered when implementing TS LCO 3.0.6:

- SUPPORT SYSTEM(S) specifically addressed in Technical Specifications, and
- SUPPORT SYSTEM(S) that are not specifically addressed in Technical Specifications

NOTE

It may be necessary to perform OPERABILITY Determinations in accordance with Procedure RS-AA-105 in order to determine SUPPORTED SYSTEMS made Inoperable by Inoperable SUPPORT SYSTEMS.

If required SUPPORT SYSTEM(S) is addressed in the Technical Specifications, then only the SUPPORT SYSTEM(S) Conditions and Actions must be entered per TS LCO 3.0.6 (i.e., "cascading" to the SUPPORTED SYSTEM(S) is not required).

If required SUPPORT SYSTEM(S) is NOT addressed in the Technical Specifications, then impact of the SUPPORT SYSTEM(S) inoperability must be evaluated with respect to any SUPPORTED SYSTEM(S) that is addressed in Technical Specifications.

E.1.4 A single component inoperability may result in multiple inoperabilities within a single train and affect multiple TS LCOs. TS LCO 3.0.6 limits the amount of "cascading" Actions that are required when an inoperable SYSTEM(S) renders a SUPPORTED SYSTEM(S) inoperable.

E.1.5 Any SUPPORT SYSTEM(S) inoperability must be evaluated with respect to the existing plant conditions to ensure that a Loss of Safety Function (LOSF) does not exist.

Example: The loss of Residual Heat Removal Service Water (RHRSW) Pump to one RHRSW heat exchanger. If the heat exchanger bypass valve was found stuck open in the opposite subsystem, a LOSF will exist following a loss-of-coolant-accident and this plant configuration must be evaluated.

E.1.6 When exception of TS LCO 3.0.6 is utilized, evaluations are required in accordance with TS 5.5.11, "Safety Function Determination Program (SFDP)".

E.1.7 If LOSF is determined to exist by this Program, the appropriate Conditions and Required Actions of the TS LCO in which the LOSF exists are required to be entered.

E.1.8 When SUPPORT SYSTEM(S) Required Action directs a SUPPORTED SYSTEM(S) to be declared inoperable or directs entry into Conditions and Required Actions for a SUPPORTED SYSTEM(S), the applicable Conditions and Required Actions shall be entered in accordance with TS LCO 3.0.2.

E.1.9 It should be noted that for cases in which the inoperable SUPPORT SYSTEM(S) is addressed in Technical Specifications, "cascading" Conditions and Required Actions may still be performed in lieu of entry into TS LCO 3.0.6.

E.2 T.S. 5.5.11, SAFETY FUNCTION DETERMINATION PROGRAM (SFDP) REQUIREMENTS

> **NOTE**
>
> If failure of a TS required SUPPORT SYSTEM(S) results in the inoperability of a SYSTEM(S) outside of the TS, and that SYSTEM(S) is subsequently relied upon by a SUPPORTED SYSTEM(S) to remain OPERABLE, then TS LCO 3.0.6 could apply and only the SUPPORT SYSTEM(S) Required Actions would be entered.

E.2.1 When TS LCO 3.0.6 is used as an exception to TS LCO 3.0.2, an evaluation is required to ensure a LOSF is detected and appropriate actions are taken.

E.2.2 Therefore, the SFDP requires:

E.2.2.1 Cross train checks to ensure a LOSF does not go undetected;

- Since "cascading" the Conditions and Required Actions of a Specification are not required when applying TS LCO 3.0.6, a possibility exists that unrelated concurrent failures of more than one SYSTEM(S) could result in the complete loss of both trains of a SUPPORTED SYSTEM(S). Therefore, upon a failure to meet two or more LCOs during the same time period, an evaluation shall be conducted to determine if a LOSF exists. Generally, this is done by confirming that the remaining required redundant SYSTEM(S) are OPERABLE. (Per ATTACHMENT 1 and TABLE 1) If a LOSF does exist, the SFDP directs that the appropriate actions be taken.

E.2.2.2 Placing the plant in a safe condition if a LOSF is detected;

- If LOSF is determined to exist by this Program, the appropriate Conditions and Required Actions of the LCO in which the LOSF exists are required to be entered per step E.3.4.

E.2.2.3 Controls on extending completion times on inoperable supported SYSTEM(S);

- MOST is determined per Attachment 2.

E.2.2.4 Appropriate limitations and remedial or compensatory actions to be taken as a result of the support SYSTEM(S) inoperability.

E.3 PROGRAM IMPLEMENTATION

Performing steps E.3.1 thru E.3.7 and / or use of the Flowchart (Figure 1) will implement the requirements of the SFDP.

E.3.1 Does the degraded SYSTEM(S) render a TS required SYSTEM(S) inoperable?

E.3.1.1 If NO, then no further evaluation is necessary.

E.3.1.2 If YES, then evaluate this inoperabilities impact on any current SFDs and document on worksheet.

E.3.2 Is the inoperable SYSTEM(S) also a SUPPORT SYSTEM(S)?

E.3.2.1 If NO, then perform Conditions and Required Actions for the inoperable SYSTEM(S).

E.3.2.2 If YES, then evaluate all Conditions and Required Actions of any SUPPORTED SYSTEM(S) that are rendered inoperable as a result of this TS SUPPORT SYSTEM Inoperability.

E.3.3 Does the Inoperable SUPPORT SYSTEM(S) Specification Conditions and Required Actions direct either the Immediate Declaration of Inoperability of SUPPORTED SYSTEM(S) or performance of any SUPPORTED SYSTEM(S) Required Action(s)?

E.3.3.1 If YES, then enter the TS Condition for the SUPPORTED SYSTEM(S) as directed and perform the Required Actions.

E.3.3.2 If NO, then:

EITHER

- PERFORM both the SUPPORT and the SUPPORTED SYSTEM(S) Required Actions.

<u>OR</u>

- PERFORM SUPPORT SYSTEM(S) Required Actions, <u>And</u>
- PERFORM a LOSF Evaluation for ALL inoperable SUPPORT and SUPPORTED SYSTEM(S) , per ATTACHMENT 1 and Table 1.

E.3.4 <u>If</u> LOSF is determined to exist, <u>then</u> perform the appropriate Conditions and Required Actions as determined from using the following guidance.

E.3.4.1 SINGLE SUPPORT SYSTEM INOPERABILITY-

<u>When</u> LOSF is solely due to a single T.S. SUPPORT SYSTEM (e.g., loss of a pump suction source due to low tank level) the appropriate LCO is the LCO for the SUPPORT SYSTEM. The Actions for the SUPPORT SYSTEM LCO adequately address the inoperabilities of that system without reliance upon the Actions of the SUPPORTED SYSTEM.

E.3.4.2 MULTIPLE SUPPORT SYSTEM INOPERABILITY-

<u>When</u> LOSF is due to multiple T.S. SUPPORT SYSTEM inoperabilities, the appropriate LCO is the LCO for the SUPPORTED SYSTEMS. (e.g. loss of minimum flow switch on Division 1 and the 'B' RHR Pump is inoperable. LOSF associated with ECCS may exist following a loss-of-coolant-accident and this plant configuration must be evaluated.)

E.3.5 <u>If</u> <u>NO</u> LOSF exists or LOSF is solely due to a single T.S. support system, <u>then</u> for all SUPPORTED SYSTEM(S) which are rendered inoperable:

E.3.5.1 Invoke TS LCO 3.0.6 to defer entry into the Conditions and Required Actions associated with the inoperable SUPPORTED SYSTEM(S) by the following:

E.3.5.1.1 Calculate the MOST for the inoperable SUPPORTED SYSTEM(S) using ATTACHMENT 2.

E.3.5.1.2 Complete the SFDP Worksheet per Attachment 3.0.

- When filling out the SFD Worksheet it is only necessary to enter names of those SUPPORTED SYSTEMS that are made Inoperable by the Inoperable SUPPORT SYSTEM. It is not necessary to identify either OPERABLE SUPPORTED SYSTEMS or SUPPORTED SYSTEMS that are not in the MODE OF APPLICABILITY.

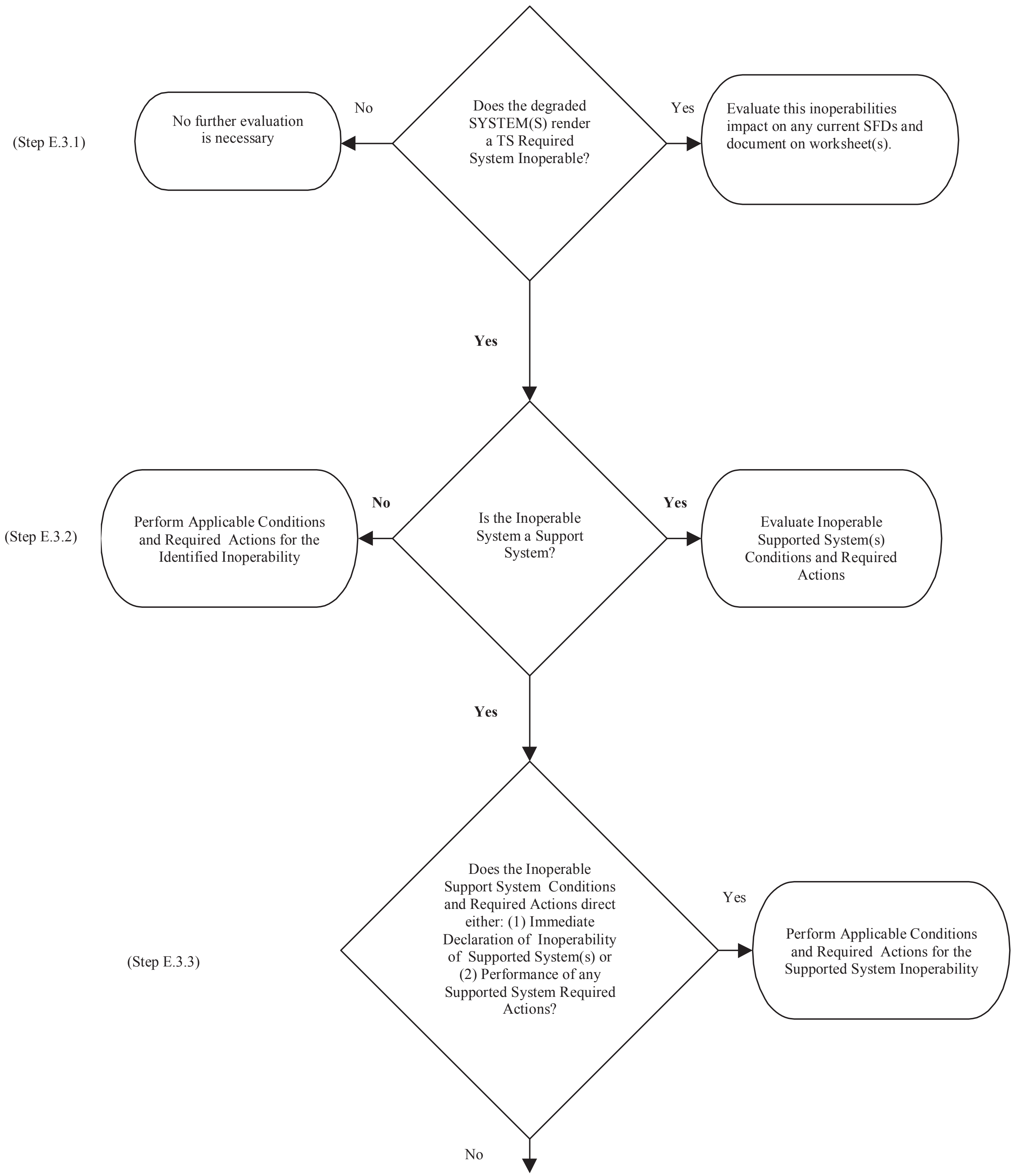
EXAMPLE:

Assume the "C" LPCI Pump minimum flow switch is INOPERABLE which results in TS LCO 3.3.5.1 not being met while the Unit is in MODE 1. A review indicates that TS LCO 3.3.5.1 equipment supports systems governed by TS 3.5.1, TS 3.5.2, TS 3.8.1, and TS 3.8.2. Although TS 3.8.1 and TS 3.8.2 are supported by TS 3.3.5.1 (the emergency DGs are started by a Injection Spray Logic signal) , it would not be necessary to list these supported LCOs because they are not made INOPERABLE by the INOPERABLE minimum flow switch. It is also not necessary to list TS 3.5.2 because this LCO is not applicable in MODE 1. TS LCO 3.5.1 is the only SUPPORTED SYSTEM made INOPERABLE by the minimum flow switch.

E.3.6 If SUPPORTED SYSTEM(S) is NOT restored to OPERABLE status (by restoring the SUPPORT SYSTEM(S) and all associated SUPPORTED SYSTEM(S) to Operable status) within the MOST, the associated Condition for the INOPERABLE SUPPORTED SYSTEM(S) Completion Time not being met shall be entered and the Required Actions shall be performed.

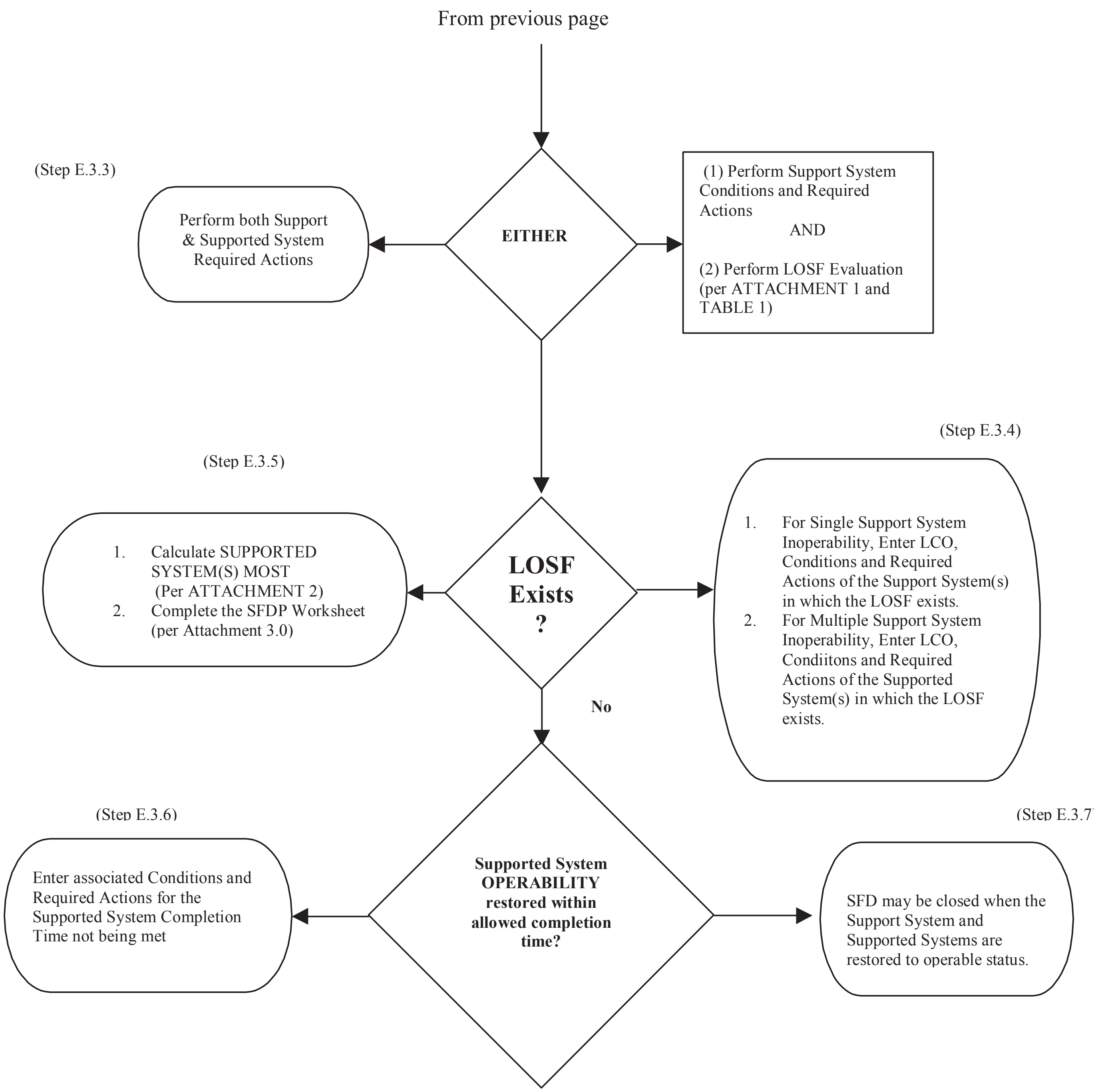
E.3.7 The SFD may be closed when the INOPERABLE SUPPORT SYSTEM and SUPPORTED SYSTEM(S) on the SFDP TRACKING SHEET are restored to Operable Status. Enter the time/date when the SUPPORT SYSTEM as well as all SUPPORTED SYSTEM(S) are restored to Operable status, and sign the SFD Worksheet.

Figure 1
LOSF Evaluation Flow Chart



Go to Next Page

Figure 1 (Continued)
LOSF Evaluation Flow Chart



ATTACHMENT 1
LOSS OF SAFETY FUNCTION EVALUATION

A. Guidance for Safety Function Evaluation

TS 5.5.11 states that a LOSF exists when, assuming no concurrent single failure, and assuming no concurrent loss of offsite power or loss of onsite diesel generator(s), a safety function assumed in the accident analysis cannot be performed.

For the purpose of this program, a “graduated” approach may be taken for determining the “safety function” of the SUPPORTED SYSTEM(S). This approach, detailed below, is graduated from most to least conservative. Even if the least conservative method is used, the requirements of TS 5.5.11 will be met. In determining whether a LOSF has occurred, at least one of these methods must be used.

Method 1: Redundant SUBSYSTEM(S)/Division/Train

a. For this method, the safety function is assumed to be the SYSTEM(S) function as described in the TS BASES. Confirm the OPERABILITY of the corresponding redundant SUPPORTED SYSTEM(S).

b. If one or more of the redundant SYSTEM(S) are found to be INOPERABLE, a LOSF may exist. The appropriate ACTIONS for a LOSF may be taken or alternatively, one of the following methods below may be used.

   A redundant train evaluation used to identify a LOSF can be seen in the following three examples.

ATTACHMENT 1 (Continued)
LOSS OF SAFETY FUNCTION EVALUATION

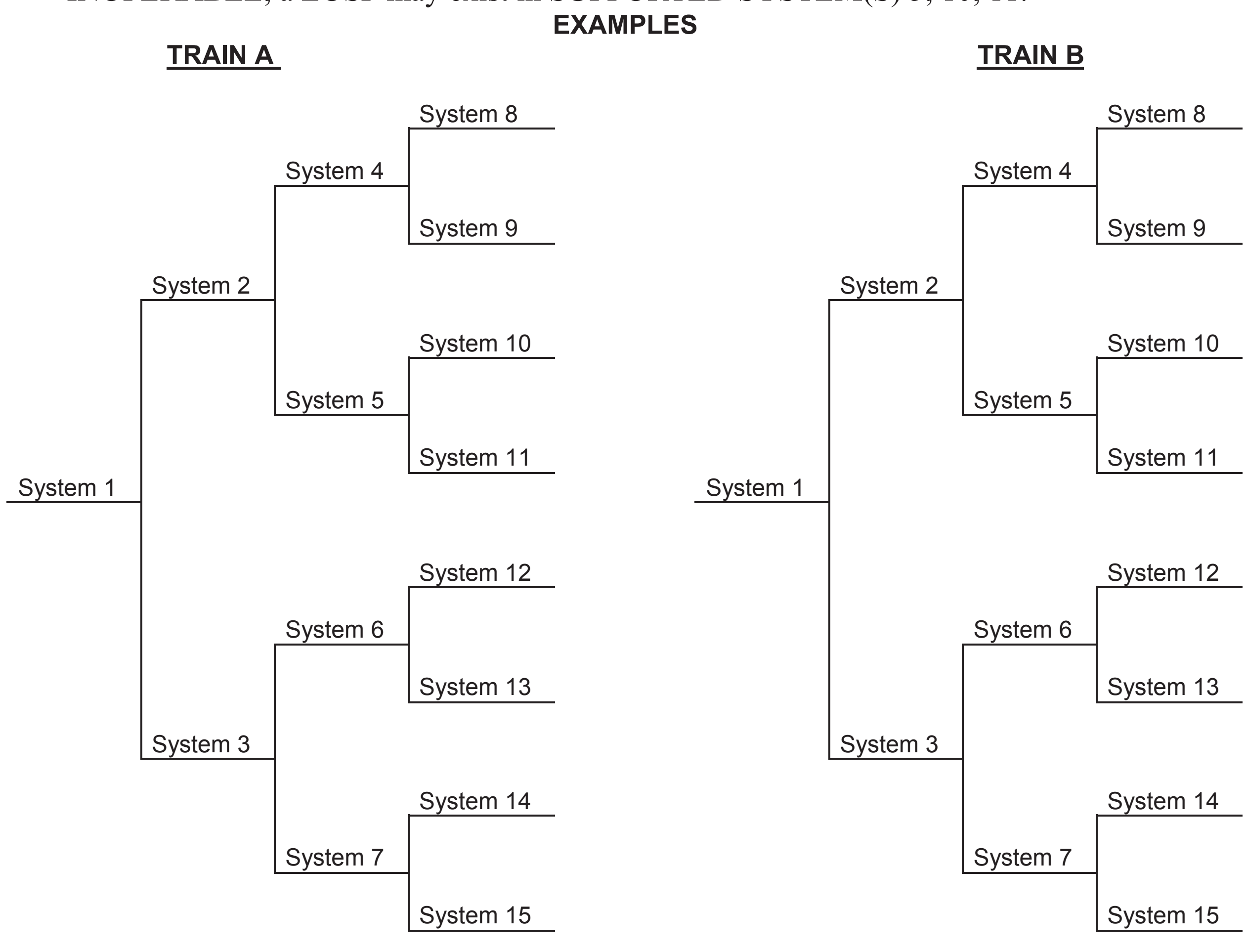
SUPPORT/SUPPORTED SYSTEM(S) DIAGRAM

EXAMPLE 1

A LOSF may exist when a SUPPORT SYSTEM is INOPERABLE, and:

A required SYSTEM redundant to the SYSTEM(S) supported by the INOPERABLE SUPPORT SYSTEM is also INOPERABLE.

If SYSTEM 2 of Train A is INOPERABLE, and SYSTEM 5 of Train B is INOPERABLE, a LOSF may exist in SUPPORTED SYSTEM(S) 5, 10, 11.



Note: Chart reads from left to right, i.e., SYSTEM 1 is a SUPPORT SYSTEM for SYSTEM(S) 2 through 15.

ATTACHMENT 1 (Continued)
LOSS OF SAFETY FUNCTION EVALUATION

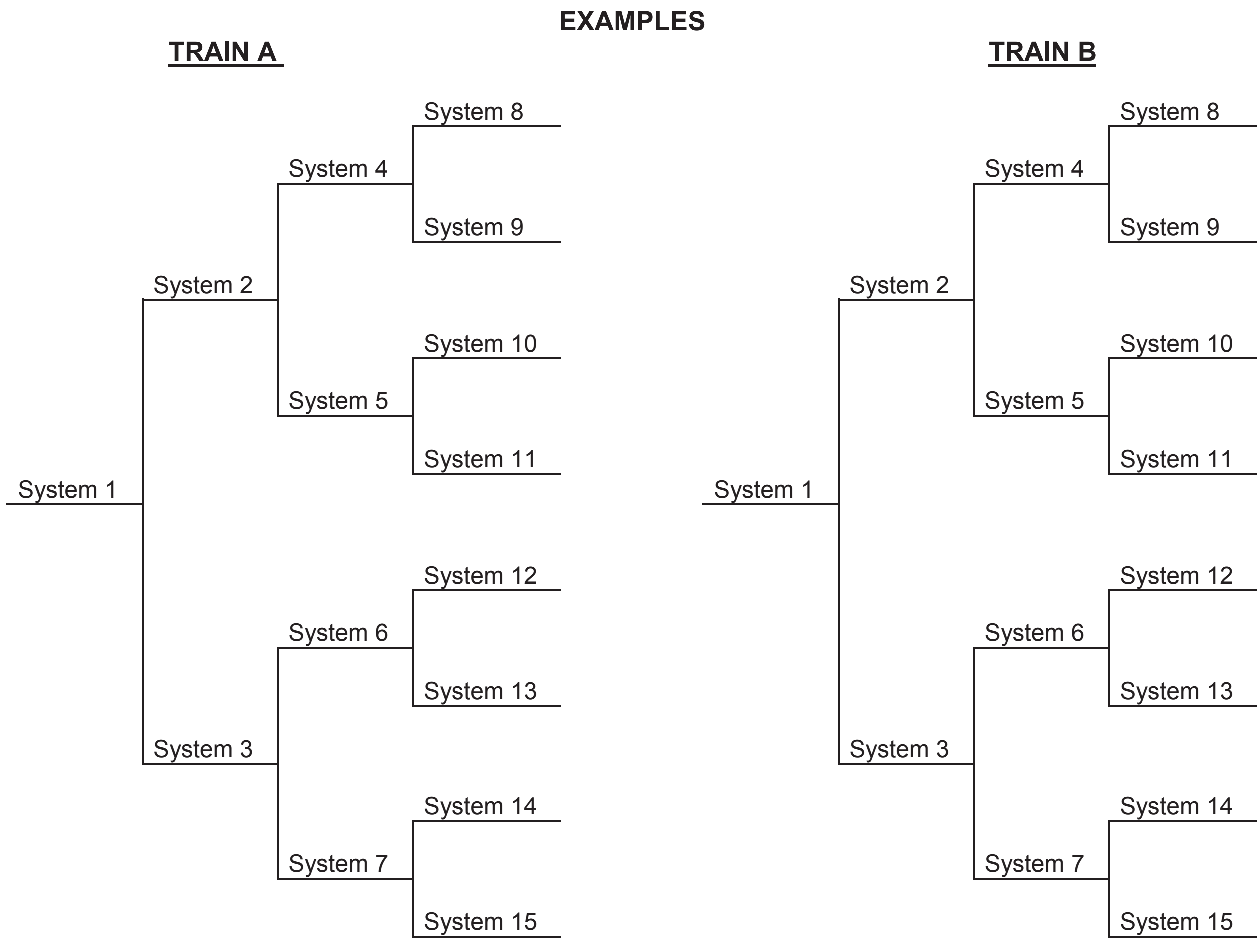
SUPPORT/SUPPORTED SYSTEM(S) DIAGRAM

EXAMPLE 2

A LOSF may exist when a SUPPORT SYSTEM is INOPERABLE, and:

A required SYSTEM redundant to the SYSTEM(S) in turn supported by the INOPERABLE SUPPORTED SYSTEM(S) is also INOPERABLE.

If SYSTEM 2 of Train A is INOPERABLE, and SYSTEM 11 of Train B is INOPERABLE, a LOSF may exist in SYSTEM 11 which is in turn supported by SYSTEM 5.



Note: Chart reads from left to right, i.e., SYSTEM 1 is a SUPPORT SYSTEM for SYSTEM(S) 2 through 15.

ATTACHMENT 1 (Continued)
LOSS OF SAFETY FUNCTION EVALUATION

SUPPORT/SUPPORTED SYSTEM(S) DIAGRAM

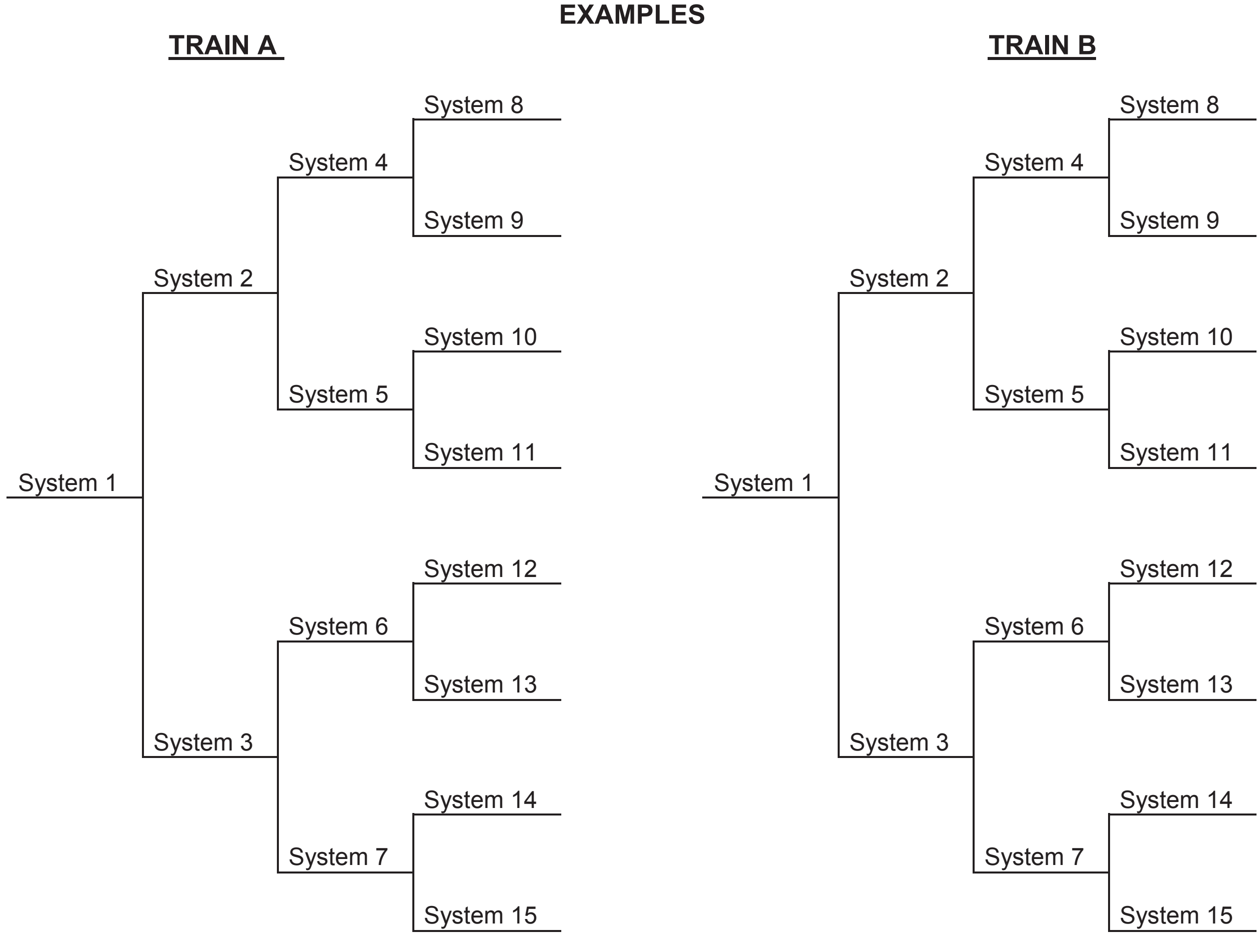
EXAMPLE 3

A LOSF may exist when a SUPPORT SYSTEM is INOPERABLE, and:

A required SYSTEM redundant to the SUPPORT SYSTEM(S) for the SUPPORTED SYSTEM(S) (a) and (b) above is also INOPERABLE.

If SYSTEM 2 of Train A is INOPERABLE, and SYSTEM 1 of Train B is INOPERABLE, a LOSF may exist in SYSTEM(S) 2, 4, 5, 8, 9, 10 and 11.

EXAMPLES



Note: Chart reads from left to right, i.e., SYSTEM 1 is a SUPPORT SYSTEM for SYSTEM(S) 2 through 15.

ATTACHMENT 1 (Continued)
LOSS OF SAFETY FUNCTION EVALUATION

Method 2: TS LCO Function Method 2: TS LCO Function

a. In certain cases, multiple SYSTEM(S) with diverse individual functions are specified under one TS LCO statement; i.e., in one Technical Specification. For these cases, the safety function may be considered to be broader than the individual SYSTEM(S) function – the safety function is the Technical Specification LCO function, not the SYSTEM(S) function (as described in Method 1 above).

b. An example of this is TS 3.5.1, "ECCS—Operating," in which four different SYSTEM(S) are included. In this case, the function as stated in the Bases, "…to cool the core during a LOCA," may be the safety function to be considered in the SFDP.

c. If a loss of TS LCO function is determined to exist, the appropriate Conditions and Required Actions for a LOSF may be taken or alternatively, the following method below may be used.

Method 3: Safety Analysis

In this approach, the function of the SYSTEM(S) described in the UFSAR accident analyses is considered to be the safety function. If the SYSTEM(S) in question is not credited in the accident analyses, or if the accident function it performs is intact, then no LOSF exists. However, if the SYSTEM(S) function is credited and is lost (i.e., the accident function it performs cannot be met), then the appropriate ACTIONS for a LOSF must be taken.

ATTACHMENT 1 (Continued)
LOSS OF SAFETY FUNCTION EVALUATION

B. Loss of Safety Function (LOSF) Evaluation

Is there any INOPERABLE or degraded SUPPORT SYSTEM(S) or SUPPORTED SYSTEM(S) equipment on the opposite/redundant train that, when coupled with this INOPERABLE equipment, might result in a complete loss of a Tech Spec required safety function.

1. NO - No LOSF exists. No further evaluation is necessary.

2. YES - A LOSF may exist. Evaluate which of the following conditions apply:

   a. The SYSTEM(S) is part of an TS LCO with multiple SUBSYSTEM(S) and the TS LCO specified function is intact. No LOSF exists.

   b. The SYSTEM(S) will still perform its required safety function as defined in the UFSAR. No LOSF exists.

   c. A LOSF exists. Perform the Required Actions in which the LOSF exists for the specific Condition(s) that apply.

C. SUPPORTED SYSTEM LOSF

When a LOSF is determined to exist, and the SFDP requires entry into the appropriate Conditions and Required Actions of the LCO in which the LOSF exists, consideration must be given to the specific type of function affected.

1. SINGLE SUPPORT SYSTEM INOPERABILITY-

   When a LOSF is solely due to a single T.S. SUPPORT SYSTEM (e.g., loss of a pump suction source due to low tank level) the appropriate LCO is the LCO for the SUPPORT SYSTEM. The Actions for the SUPPORT SYSTEM LCO adequately address the inoperabilities of that system without reliance upon the Actions of the SUPPORTED SYSTEM.

2. MULTIPLE SUPPORT SYSTEM INOPERABILITY-

   When a LOSF is due to multiple T.S. SUPPORT SYSTEM inoperabilities, the appropriate LCO is the LCO for the SUPPORTED SYSTEMS.

ATTACHMENT 2

SUPPORTED SYSTEM (S) COMPLETION TIME EXTENSIONS

BACKROUND

The T.S. require declaring SUPPORTED SYSTEM(S) INOPERABLE if a SUPPORT SYSTEM(S) inoperability renders the SUPPORTED SYSTEM(S) incapable of performing its required function. However, the Conditions and Required Actions of the SUPPORTED SYSTEM(S) do not have to be entered (i.e., the Conditions and Required Actions are not entered) except as directed by the SUPPORT SYSTEM(S) Required Actions.

Consequently, it is possible to have SUPPORTED SYSTEM(S) INOPERABLE for longer periods of time than their respective Completion Time would allow on their own. Per Technical Specifications 5.5.11, the SFDP must include measures to ensure that the SUPPORTED SYSTEM('S) Completion Times are not inappropriately extended.

The following two methods are provided for ensuring Completion Times are not inappropriately extended. METHOD 1 applies to SUPPORTED SYSTEM inoperabilities associated with a single SUPPORT SYSTEM inoperability. METHOD 2 is applicable to those SUPPORTED SYSTEM inoperabilities due to multiple SUPPORT SYSTEM inoperabilities.

<u>METHOD 1</u>

Single SUPPORT SYSTEM(S) INOPERABLE affecting SUPPORTED SYSTEM(S)

1. With a single SUPPORT SYSTEM(S) INOPERABLE, the affected SUPPORTED SYSTEM(S) Conditions and Required Actions are not required to be entered unless directed by the SUPPORT SYSTEM(S) Required Actions.

2. The method to accomplish this will be in the form of a calculated Maximum Out Of Service Time (MOST). The MOST will ensure that a time limit is placed on the INOPERABLE SUPPORTED SYSTEM(S) such that when an additional SUPPORT SYSTEM(S) becomes INOPERABLE no extension of time is added to the original MOST. MOST is only used when implementing the SFDP.

3. The MOST is calculated in the following manner:

Support LCO Required Action Completion Time	+	Supported LCO Required Action = MOST Completion Time
Support Train A, LCO AAA (72hrs)	+	Supported Train A, LCO BBB (72 hrs)=144 hrs
	+	Supported Train A, LCO UUU (72 hrs)=144 hrs
	+	Supported Train A, LCO ZZZ(72 hrs)=240 hrs
	+	Supported Train A, LCO RRR (168 hrs) = 240 hrs

ATTACHMENT 2 (Continued)

SUPPORTED SYSTEM (S) COMPLETION TIME EXTENSIONS

EXAMPLE 1

Single SUPPORT SYSTEM(S) inoperable affecting SUPPORTED SYSTEM(S)

While in Mode 1, the A and B RHRSW SUBSYSTEM Pumps are declared inoperable at 0800 on 8/13/01. TS LCO 3.7.1 Conditions and Required Actions are entered. A LOSF is performed and all B train components are verified to be operable. Therefore, the TS LCO 3.0.6 and the SFDP can be implemented. All SUPPORTED SYSTEM(S) have been identified and the calculated MOST are as follows:

SUPPORT / SUPPORTED SYSTEM(S)		LCO CONDITION	COMPLETION TIME	MOST
RHRSW Pump (A & B)	Support	3.7.1 A.1	30 days	
RHRSW SUBSYSTEM	Support	3.7.1 C.1	7 days	
RHR Suppression Pool Cooling	Supported	3.6.2.4 A.1	7 days	14 days
RHR Suppression Pool Spray	Supported	3.6.2.4 A.1	7 days	14 days

3.7.1 Condition A applies to both inoperable pumps. One RHRSW pump must be operable at 0800 on 8/20/01 (7 days) at which time the RHR Suppression Pool Cooling and Spray are operable. The RHR Suppression Pool Cooling and Spray must be operable at 0800 on 8/27/01 (MOST). The second RHRSW pump must be operable at 0800 on 9/12/01 (30 days).

ATTACHMENT 2 (Continued)

SUPPORTED SYSTEM (S) COMPLETION TIME EXTENSIONS

EXAMPLE 2

With the A and B RHRSW pumps still inoperable, the A and B RHR pumps are determined to be inoperable at 0800 on 8/19/01. TS LCO 3.6.2.3, 3.6.2.4 Conditions and Required Actions are evaluated. It has been determined that both Condition 3.6.2.3.A and 3.6.2.4.A are now applicable.

SUPPORT / SUPPORTED SYSTEM(S)		LCO CONDITION	COMPLETION TIME	MOST
RHRSW Pump (A & B)	Support	3.7.1 A.1	30 days	
RHRSW SUBSYSTEM	Support	3.7.1 C.1	7 days	
ECCS - Operating (LPCI A & B)	Support	3.5.1.A.1	30 days	
ECCS - Operating	Support	3.5.1.B.1	7 days	
RHR Suppression Pool Cooling	Support	3.6.2.3 A.1	7 days	
RHR Suppression Pool Cooling	Supported	3.6.2.3 A.1	7 days	14 days
RHR Suppression Pool Spray	Support	3.6.2.4 A.1	7 days	
RHR Suppression Pool Spray	Supported	3.6.2.4 A.1	7 days	14 days

One RHRSW pump must be operable at 0800 on 8/20/01 (7 days). The A and B RHR pumps must be operable at 0800 on 8/26/01 (7 days). The RHR Suppression Pool Cooling and Spray must still be operable at 0800 on 8/27/01 (MOST). The second RHRSW pump must still be operable at 0800 on 9/12/01 (30 days).

ATTACHMENT 2 (Continued)

SUPPORTED SYSTEM (S) COMPLETION TIME EXTENSIONS

EXAMPLE 3

The A RHRSW pump is declared operable at 1000 on 8/19/01 while the A and B RHR pumps remain inoperable. TS LCO 3.7.1 Conditions and Required Actions are evaluated. It has been determined that Condition 3.7.1.C for the RHRSW system is no longer applicable.

SUPPORT / SUPPORTED SYSTEM(S)		LCO CONDITION	COMPLETION TIME	MOST
RHRSW Pump A	Support	3.7.1 A.1	30 days	
ECCS - Operating (LPCI A & B)	Support	3.5.1.A.1	30 days	
ECCS - Operating	Support	3.5.1.B.1	7 days	
RHR Suppression Pool Cooling	Support	3.6.2.3 A.1	7 days	
RHR Suppression Pool Spray	Support	3.6.2.4 A.1	7 days	
RHR Suppression Pool Cooling	Supported	3.6.2.3 A.1	7 days	14 days
RHR Suppression Pool Spray	Supported	3.6.2.4 A.1	7 days	14 days

The RHR A and B pumps must be operable at 0800 on 8/26/01 (7 days) which supports the restoration of both RHR Suppression Pool Cooling / Spray and ECCS LCOs. The RHR Suppression Pool Cooling and Spray must be operable at 0800 on 8/27/01 (**Original MOST)**. The second RHRSW pump must be operable at 0800 on 9/12/01 (30 days).

ATTACHMENT 2 (Continued)

SUPPORTED SYSTEM (S) COMPLETION TIME EXTENSIONS

EXAMPLE 4

With the A and B RHR and B RHRSW pumps still inoperable, the A RHRSW pump is again determined to be inoperable at 0800 on 8/25/01. TS LCO 3.7.1.C Conditions and Required Actions are entered.

SUPPORT / SUPPORTED SYSTEM(S)		LCO CONDITION	COMPLETION TIME	MOST
RHRSW Pump (A & B)	Support	3.7.1 A.1	30 days	
RHRSW SUBSYSTEM	Support	3.7.1 C.1	7 days	
ECCS - Operating (LPCI A & B)	Support	3.5.1.A.1	30 days	
ECCS - Operating	Support	3.5.1.B.1	7 days	
RHR Suppression Pool Cooling	Support	3.6.2.3 A.1	7 days	
RHR Suppression Pool Spray	Support	3.6.2.4 A.1	7 days	
RHR Suppression Pool Cooling	Supported	3.6.2.3 A.1	7 days	14 days
RHR Suppression Pool Spray	Supported	3.6.2.4 A.1	7 days	14 days

The A and B RHR pumps must be operable at 0800 on 8/26/01. The RHR Suppression Pool Cooling and Sprays must be operable at 0800 on 8/27/01 (Original MOST). Therefore, at least one of the RHRSW pumps must be operable 0800 on 8/27/01 in order for the RHR Suppression Pool Cooling and Spray to be operable.

If the B RHRSW pump is made operable, then the A RHRSW pump must be operable at 0800 on 9/13/01 (30 days + 24 hour extension allowed by TS 1.3)

ATTACHMENT 2 (Continued)

SUPPORTED SYSTEM (S) COMPLETION TIME EXTENSIONS

EXAMPLE 5

A Division 1 Core Spray Pump Discharge Flow - Low (BYPASS) instrument has become inoperable. TS LCO 3.3.5.1 Conditions and Required Actions are entered. A LOSF is performed and all Division 2 components are verified to be operable. Therefore, the TS LCO 3.0.6 and the SFDP can be implemented. All SUPPORTED SYSTEM(S) have been identified and the calculated MOST are as follows:

SUPPORT / SUPPORTED SYSTEM(S)		LCO CONDITION	COMPLETION TIME	MOST
Core Spray Pump Discharge Flow	Support	3.3.5.1 E.2	7 Days	
ECCS SYSTEM (CS)	Supported	3.5.1 B.1	7 Days	14 Days

In this example, the channel must be restored to operable status within 7 Days per Required Action 3.3.5.1.E.2, or the Supported CS pumps must be declared inoperable per 3.3.5.1.H..1.

ATTACHMENT 2 (Continued)

SUPPORTED SYSTEM (S) COMPLETION TIME EXTENSIONS

METHOD 2

Multiple SUPPORT SYSTEM(S) become INOPERABLE affecting the same SUPPORTED SYSTEM(S)

There may be some cases where two SUPPORT SYSTEMS for a common SUPPORTED SYSTEM become INOPERABLE simultaneously. In this case, the following method should be used to calculate the MOST.

a. The first SUPPORT / SUPPORTED MOST plus an additional 24 hours; or

b. The subsequent SUPPORT / SUPPORTED MOST as measured from discovery of the first SUPPORT inoperability.

EXAMPLE 1- Multiple SUPPORT SYSTEM(S)

Two SUPPORT SYSTEM(S) become INOPERABLE at different times.

1. SYSTEMS B and C SUPPORT SYSTEM A.
   SYSTEM B (SUPPORT SYSTEM) becomes INOPERABLE at T = 0 days.

   - SYSTEM A (SUPPORTED SYSTEM) Completion Time - 3 days
   - SYSTEM B (SUPPORT SYSTEM) Completion Time - 3 days
   - SYSTEM C (SUPPORT SYSTEM) Completion Time - 7 days

2. SYSTEM B (SUPPORT SYSTEM) with a Completion Time of 3 days, renders SYSTEM A (SUPPORTED SYSTEM) INOPERABLE. Method 1 is applied, which allows an overall MOST of 6 days for the SYSTEM A (SUPPORTED SYSTEM).

3. At T = 1 day, SYSTEM C (SUPPORT SYSTEM) becomes INOPERABLE and has a Completion Time of 7 days. SYSTEM C (SUPPORT SYSTEM) also supports SYSTEM A (SUPPORTED SYSTEM). SYSTEM B (SUPPORT SYSTEM) continues to remain INOPERABLE through its Completion Time T = 3 days.

4. Once SYSTEM C (SUPPORT SYSTEM) becomes INOPERABLE concurrent with SYSTEM B, Method 2 is applied at T=1, the Most is as follows:

   Method 2a: Original MOST (SYSTEM A +B) + 24 hours = 7days, OR

   Method 2b: New MOST (SYSTEM A + C) = 10 days measured from T = 0.

ATTACHMENT 3

SFDP TRACKING WORKSHEET

INSTRUCTIONS

The Safety Function Determination (SFD) Worksheet is used to document the supported systems of an INOPERABLE SUPPORT SYSTEM, track their Maximum Out Of Service Time (MOST), and document whether or not a loss of safety function exists. It is also the mechanism for documenting the reevaluation of safety function determinations that are necessary when subsequent LCO's are entered.

1. Enter the noun name of the INOPERABLE SUPPORT SYSTEM / component.

2. SUPPORT SYSTEM Tech Spec Condition / Required Action.

3. Date and time of entry into LCO Conditions and Required Actions for the SUPPORT SYSTEM.

4. Completion time allowed for the Required Action of the SUPPORT SYSTEM Tech Spec.

5. Enter the noun name of each Tech Spec system supported by the INOPERABLE SUPPORT SYSTEM.

6. For each supported system, list the Tech Spec Condition / Required Action.

7. Record the allowed completion time for the supported system Required Action.

8. Perform a cross train check (ATTACHMENT 1/ Method 1 and TABLE 1) to verify operability of the INOPERABLE supported system's redundant equipment, as well as the support features for the redundant equipment. Block 8 is filled in with yes or no.

ATTACHMENT 3 (Continued)

SFDP TRACKING WORKSHEET

9. Based on the results of the cross train check performed in step 8 of the worksheet, determine whether or not the safety function of the supported system has been lost. If the cross train check, ATTACHMENT 1/ Method 1 has failed or can not be performed, Methods 2 or 3 may be used to assess the status of the safety function in question. If the safety function has been lost, then enter the appropriate Conditions and Required Actions for that system or component using the following guidance: 1. SINGLE SUPPORT SYSTEM INOPERABILITY- When a LOSF is solely due to a single T.S. SUPPORT SYSTEM (e.g., loss of a pump suction source due to low tank level) the appropriate LCO is the LCO for the SUPPORT SYSTEM. The Actions for the SUPPORT SYSTEM LCO adequately address the inoperabilities of that system without reliance upon the Actions of the SUPPORTED SYSTEM. 2. MULTIPLE SUPPORT SYSTEM INOPERABILITY- When a LOSF is due to multiple T.S. SUPPORT SYSTEM inoperabilities, the appropriate LCO is the LCO for the SUPPORTED SYSTEMS.

10. If the safety function has not been lost or LOSF is solely due to a single T.S. support system, calculate the Maximum Out of Service Time for the supported system. If ATTACHMENT 2 Method 1 is used, this will be the sum of block 4 and block 7. If Method 2 is used, see ATTACHMENT 2.

11. Expiration time: Time determined in either Method 1 or 2 ATTACHMENT 2 measured from the time in step 3 (Date/Time Entered) in HR: MIN on the MM/DD/YR.

12. The comment block can be used to record any notes or other references.

13. Preparer sign and date.

14. Sign and date for Verification of the SFD, indicating that you concur with the listed results.

15. As subsequent inoperabilities occur, all existing SFD's must be reviewed to determine their validity. Record the new LCO Condition and Required Actions and initial and date indicating either yes, the SFD is still valid, or no the SFD is no longer valid. If the SFD is no longer valid based on the new LCO Conditions and Required Actions, a new SFD must be performed. Attach the new SFD to the now invalid SFD.

16. The SFD may be closed out when the INOPERABLE SUPPORT SYSTEM and SUPPORTED SYSTEM(S) listed on the SFDP Tracking Sheet are returned to OPERABLE STATUS. Enter the Time and Date when the SUPPORT SYSTEM and SUPPORTED SYSTEM(S) are returned to OPERABLE STATUS and sign the Worksheet.

ATTACHMENT 3 (Continued)

SFDP TRACKING WORKSHEET

SUPPORT SYSTEM INOPERABLE

1. System Name / Component ____________________   2. Tech Spec Condition / Required Action ________________

3. Date / Time Entered ________________   4. Completion Time ________________

SUPPORTED SYSTEMS / COMPONENTS

5. Supported System Name	6. T.S. Condition / Required Action	7. Completion Time	8. Redundant Inoperability?	9. Loss of Safety Function?	10. M.O.S.T.	11. Expiration Time	12. Comments

13. Prepared by: ________________
sign and date

14. Verified by: ________________
sign and date

15. REVIEW FOR SUBSEQUENT INOPERABILITIES (See Attached Worksheet)

16. SFD CLOSE OUT: The Support Systems and Supported System(s) listed above have been returned to OPERABLE status

____
Time / Date / Signature

ATTACHMENT 3 (Continued)

SFDP TRACKING WORKSHEET

SFDP REVIEW FOR SUBSEQUENT INOPERABILITIES		
NEW LCO CONDITION #	SFDPs VALID (Y / N)	VERIFIED BY (INITIAL / DATE)

TABLE 1

CROSS TRAIN CHECK GUIDANCE

Guidelines for Performing Cross Train Checks

The following matrix is meant to list possible SUPPORT to SUPPORTED LCO relationships for the purpose of implementing the cross train checks as required by LCO 3.0.6. and 5.5.11.

This matrix does **NOT**:

- Cover all possible combinations or permutations of SUPPORT / SUPPORTED LCO relationships.
- Cover SUPPORT / SUPPORTED relationships for items outside of Tech Spec (i.e., room coolers or snubbers).
- Cover SUPPORT / SUPPORTED relationships for LCOs that are **NOT** applicable in a given mode
- Cover Technical Requirement Manual LCOs or features.
- Include Support Features and Supported Systems if the Required Actions for the INOPERABLE Support Feature direct the entry into the TS ACTIONS for the Supported System.

The purpose behind this matrix is to provide guidance when assessing a LOSF on based on SUPPORTED system LCOs, due to inoperability of a SUPPORT SYSTEM LCO.

The following minimum items should be considered when evaluating the redundant train:

- Panel Walkdown
- DEL Review
- Schedule Review
- Current Outage Reports
- Physical walkdown as needed by the US
- OOS Review
- TMOD
- Operability Evaluations

Each situation should be assessed on its own merit, to determine LCO impact.

TABLE 1 (Continued)

CROSS TRAIN CHECK GUIDANCE

Support Feature TS Number	Support Feature	Supported System TS Number	Supported System
3.3.5.1	Emergency Core Cooling System (ECCS) Instrumentation	3.5.1 3.5.2 3.8.1 3.8.2	ECCS - Operating ECCS - Shutdown AC Sources - Operating AC Sources - Shutdown
3.3.5.2	Reactor Core Isolation Cooling (RCIC) System Instrumentation	3.5.3	RCIC System
3.3.6.1	Primary Containment Isolation Instrumentation	3.1.7 3.4.7 3.4.8 3.6.1.3 3.9.8 3.9.9	Standby Liquid Control (SLC) System Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown Primary Containment Isolation Valves (PCIVs) Residual Heat Removal (RHR) Residual Heat Removal (RHR) - High Water Level Residual Heat Removal (RHR) - Low Water Level
3.3.6.2	Secondary Containment Isolation Instrumentation	3.6.4.2 3.6.4.3	Secondary Containment Isolation Valves (SCIVs) Standby Gas Treatment (SGT) System
3.3.6.3	Relief Valve Instrumentation	3.4.3 3.6.1.6	Safety and Relief Valves Low Set Relief Valves

Support Feature TS Number	Support Feature	Supported System TS Number	Supported System
3.3.7.1	Control Room Emergency Ventilation (CREV) System Instrumentation	3.7.4	Control Room Emergency Ventilation (CREV) System
3.3.8.1	Loss of Power (LOP) System Instrumentation	3.3.5.1 3.8.1 3.8.2	Emergency Core Cooling System (ECCS) Instrumentation AC Sources - Operating AC Sources - Shutdown
3.6.1.7	Reactor Building-to-Suppression Chamber Vacuum Breakers	3.6.1.1	Primary Containment
3.6.1.8	Suppression Chamber-to-Drywell Vacuum Breakers Secondary Containment Isolation Valves (SCIVs)	3.6.1.1	Primary Containment
3.6.4.2	Secondary Containment Isolation Valves (SCIVs)	3.6.4.1	Secondary Containment
3.6.4.3	Standby Gas Treatment (SGT) System	3.6.4.1	Secondary Containment

TABLE 1 (Continued)

CROSS TRAIN CHECK GUIDANCE

Support Feature TS Number	Support Feature	Supported System TS Number	Supported System
3.7.1	Residual Heat Removal Service Water (RHRSW) System	3.4.7	Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown
		3.4.8	Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown
		3.6.2.3	Residual Heat Removal (RHR) Suppression Pool Cooling
		3.6.2.4	Residual Heat Removal (RHR) Suppression Pool Spray
		3.7.5	Control Room Emergency Ventilation Air Conditioning (AC) System
		3.9.8	Residual Heat Removal (RHR) - High Water Level
		3.9.9	Residual Heat Removal (RHR) - Low Water Level
3.7.2	Diesel Generator Cooling Water (DGCW) System	3.5.1	ECCS - Operating
		3.5.2	ECCS - Shutdown
		3.8.1	AC Sources - Operating
		3.8.2	AC Sources - Shutdown
3.7.3	Ultimate Heat Sink (UHS)	3.7.1	Residual Heat Removal Service Water (RHRSW) System
		3.7.2	Diesel Generator Cooling Water (DGCW) System
3.8.1	AC Sources - Operating	3.8.7	Distribution System - Shutdown (AC Portion Only)
3.8.2	AC Sources - Shutdown	3.8.8	Distribution System - Shutdown (AC Portion Only)
3.8.4	DC Sources - Operating	3.8.7	Distribution System - Shutdown (DC Portion Only)
3.8.5	DC Sources - Shutdown	3.8.8	Distribution System - Shutdown (DC Portion Only)

TABLE 1 (Continued)

CROSS TRAIN CHECK GUIDANCE

Support Feature TS Number	Support Feature	Supported System TS Number	Supported System
3.8.7 (AC Only)	Distribution System – Operating (AC portion Only)	3.1.7	Standby Liquid Control (SLC) System
		3.3.3.1	Post Accident Monitoring (PAM) Instrumentation
		3.3.5.1	Emergency Core Cooling System (ECCS) Instrumentation
		3.3.5.2	Isolation Condenser (IC) System Instrumentation (17 & 20 valves)
		3.3.6.1	Primary Containment Isolation Instrumentation
		3.3.6.2	Secondary Containment Isolation Instrumentation
		3.3.7.1	Control Room Emergency Ventilation (CREV) System Instrumentation
		3.4.4	RCS Operational Leakage
		3.4.5	RCS Leakage Detection Instrumentation
		3.4.7	Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown
		3.5.1	Emergency Core Cooling System (ECCS) - Operating
		3.5.3	RCIC System

TABLE 1 (Continued)

CROSS TRAIN CHECK GUIDANCE

Support Feature TS Number	Support Feature	Supported System TS Number	Supported System
3.8.7 (continued) (AC Only)	Distribution System – Operating (AC portion Only)	3.6.1.3	Primary Containment Isolation Valves (PCIVs)
		3.6.2.3	Residual Heat Removal (RHR) Suppression Pool Cooling
		3.6.2.4	Residual Heat Removal (RHR) Suppression Pool Spray
		3.6.4.2	Secondary Containment Isolation Valves (SCIVs)
		3.6.4.3	Standby Gas Treatment (SGT) System
		3.7.1	Residual Heat Removal Service Water (RHRSW) System
		3.7.2	Diesel Generator Cooling Water (DGCW) System
		3.7.4	Control Room Emergency Ventilation (CREV) System
		3.7.5	Control Room Emergency Ventilation Air Conditioning (AC) System
		3.7.9	Safe Shutdown Makeup Pump (SSMP) System
		3.8.1	AC Sources - Operating
		3.8.3	Diesel Fuel Oil and Starting Air
		3.8.4	DC Sources - Operating

TABLE 1 (Continued)

CROSS TRAIN CHECK GUIDANCE

Support Feature TS Number	**Support Feature**	**Supported System TS Number**	**Supported System**
3.8.7 (DC Only)	Distribution Systems – Operating (DC Only)	3.3.3.1	Post Accident Monitoring (Pam) Instrumentation
		3.3.4.1	Anticipated Transient Without SCRAM Recirculation Pump Trip (ATWS-RPT) Instrumentation
		3.3.5.1	Emergency Core Cooling System (ECCS) Instrumentation
		3.3.5.2	Reactor Core Isolation Cooling (RCIC) System Instrumentation
		3.3.6.1	Primary Containment Isolation Instrumentation
		3.3.8.1	Loss of Power (LOP) System Instrumentation
		3.3.8.2	Reactor Protection System (RPS) Electric Power Monitoring
		3.4.3	Safety and Relief Valves
		3.4.7	Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown
		3.5.1	Emergency Core Cooling System (ECCS) - Operating

TABLE 1 (Continued)

CROSS TRAIN CHECK GUIDANCE

Support Feature TS Number	Support Feature	Supported System TS Number	Supported System
3.8.7 (continued) (DC Only)	Distribution Systems – Operating (DC Portion Only)	3.5.3	RCIC System
		3.6.1.3	Primary Containment Isolation Valves (PCIVs)
		3.6.2.3	Residual Heat Removal (RHR) Suppression Pool Cooling
		3.6.2.4	Residual Heat Removal (RHR) Suppression Pool Spray
		3.7.1	Residual Heat Removal Service
		3.7.2	Diesel Generator Cooling Water (DGCW) System
		3.8.1	AC Sources - Operating

TABLE 1 (Continued)

CROSS TRAIN CHECK GUIDANCE

Support Feature TS Number	Support Feature	Supported System TS Number	Supported System
3.8.8 (AC Only)	Distribution Systems – Shutdown (AC Portion Only)	3.3.5.1	Emergency Core Cooling System (ECCS) Instrumentation
		3.3.6.1	Primary Containment Isolation Instrumentation
		3.3.6.2	Secondary Containment Isolation Instrumentation
		3.3.7.1	Control Room Air Filtration (CREV) System Instrumentation
		3.4.8	Residual Heat Removal (RHR) Shutdown Cooling System Cold Shutdown
		3.5.2	Emergency Core Cooling System (ECCS) - Shutdown
		3.6.1.3	Primary Containment Isolation Valves (PCIVs)
		3.6.4.2	Secondary Containment Isolation Valves (SCIVs)

TABLE 1 (Continued)

CROSS TRAIN CHECK GUIDANCE

Support Feature TS Number	Support Feature	Supported System TS Number	Supported System
3.8.8 (continued) (AC Only)	Distribution Systems – Shutdown (AC Portion Only)	3.6.4.3	Standby Gas Treatment (SGT) System
		3.7.1	Residual Heat Removal Service Water (RHRSW) System
		3.7.2	Diesel Generator Cooling Water (DGCW) System
		3.7.4	Control Room Emergency Ventilation (CREV) System
		3.7.5	Control Room Emergency Ventilation Air Conditioning (AC) System
		3.8.2	AC Sources - Shutdown
		3.8.3	Diesel Fuel Oil and Starting Air
		3.8.5	DC Sources - Shutdown
		3.9.8	Residual Heat Removal (RHR) - High Water Level
		3.9.9	Residual Heat Removal (RHR) - Low Water Level

TABLE 1 (Continued)

CROSS TRAIN CHECK GUIDANCE

Support Feature TS Number	Support Feature	Supported System TS Number	Supported System
3.8.8 (DC Only)	Distribution Systems – Shutdown (DC Portion Only)	3.3.5.1	Emergency Core Cooling System (ECCS) Instrumentation
		3.3.6.1	Primary Containment Isolation Instrumentation
		3.3.8.1	Loss of Power (LOP) System Instrumentation
		3.3.8.2	Reactor Protective System (RPS) Electric Power Monitoring
		3.4.8	Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown
		3.5.2	ECCS - Shutdown
		3.6.1.3	Primary Containment Isolation Valves (PCIVs)
		3.8.2	AC Sources - Shutdown
		3.9.8	Residual Heat Removal (RHR)- High Water Level
		3.9.9	Residual Heat Removal (RHR)- Low Water Level

TECHNICAL SPECIFICATIONS BASES CONTROL PROGRAM

TABLE OF CONTENTS

1.1 PURPOSE

The purpose of this Program is to provide guidance for identifying, processing, and implementing changes to the Technical Specifications (TS) Bases. This Program implements and satisfies the requirements of TS 5.5.10, "Technical Specifications (TS) Bases Control Program."

This Program is applicable to the preparation, review, implementation, and distribution of changes to the TS Bases. This Program also provides guidance for preparing TS Bases Change Packages for distribution.

1.2 REFERENCES

1. TS 5.5.10, "Technical Specifications (TS) Bases Control Program"
2. 10 CFR 50.4, "Written Communications"
3. 10 CFR 50.59, "Changes, Tests and Experiments"
4. 10 CFR 50.71, "Maintenance of Records, Making of Reports"
5. 10 CFR 50.90, "Application for Amendment of License or Construction Permit"

1.3 DEFINITIONS AND/OR ACRONYMS

1. 10 CFR 50.59 REVIEW - A written regulatory evaluation which provides the basis for the determination that a change does, or does not, require NRC approval pursuant to 10 CFR 50.59. The scope of the evaluation should be commensurate with the potential safety significance of the change, but must address the relevant safety concerns included in the Safety Analysis Report and other owner controlled documents. The depth of the evaluation must be sufficient to determine whether or not NRC approval is required prior to implementation. Depending upon the significance of the change, the evaluation may be brief; however, a simple statement of conclusion is not sufficient.

2. EDITORIAL CHANGE - Editorial changes include correction of punctuation, insignificant word or title changes, style or format changes, typographical errors, or correction of reference errors that do not change the intent, outcome, results, functions, processes, responsibilities, or performance requirements of the item being changed. Changes in numerical values shall not be considered as editorial changes. Editorial changes do not constitute a change to the TRM and therefore do not require further 10 CFR 50.59 Reviews. If the full scope of this proposed change is encompassed by one or more of the below, then the change is considered editorial.

   - Rewording or format changes that do not result in changing actions to be accomplished.
   - Deletion of cycle-specific information that is no longer applicable.
   - Addition of clarifying information, such as:
     - Spelling, grammar, or punctuation changes
     - Changes to references
     - Name or title references

1.4 PROGRAM DESCRIPTION

1. A Licensee may make changes to the TS Bases without prior NRC approval provided the changes do not require either of the following:

   a. A change in the TS as currently incorporated in the license; or

   b. A change to the Updated Final Safety Analysis Report (UFSAR) or TS Bases that requires NRC approval pursuant to 10 CFR 50.59.

2. Changes that meet the above criteria (i.e., 1.4.1.a or 1.4.1.b) shall be submitted to the NRC pursuant to 10 CFR 50.90 and reviewed and approved by the NRC prior to implementation.

3. The TS Bases shall be maintained consistent with the UFSAR.

4. If a change to the TS Bases is not consistent with the UFSAR, then the cognizant Engineer shall prepare and submit a UFSAR Change Package when the TS Bases Change Request is submitted to Regulatory Assurance (RA) for processing.

5. Changes to the TS Bases that do not require prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e), as modified by approved exemptions.

6. Any change to a Station's TS Bases shall be transmitted, via Attachment D, "Technical Specifications Bases Change Applicability Review Form," to the Regulatory Assurance Managers (RAMs) at each of the other Stations. The RAM will review the TS Bases change for applicability at their respective Station and document their review on Attachment D.

7. TS Bases changes associated with a TS Amendment shall be implemented consistent with the implementation requirements of the TS Amendment.

8. Cantera Licensing (CL) is responsible for the control and distribution of the TS Bases. In order to prevent distribution errors (i.e., omissions or duplications), CL shall maintain the master TS Bases distribution list.

1.5 PROGRAM IMPLEMENTATION

1. TS Bases Change Requestor identifies the need for a revision to the TS Bases and notifies the RA Licensing Engineer (i.e., hereafter referred to as RA LE). A TS Bases change can be initiated through any Stations' RA. TS Bases Change Requestor notifies their counterparts on the need for a change.

2. RA LE notifies their counterparts of identified need for revision to the TS Bases.

3. RA LE obtains concurrence from CL on the need for a change.

4. CL Engineer (i.e., hereafter referred to as CLE) assigns a TS Bases Change Request Number (CR #) and records on Attachment B, "Technical Specifications Bases Change Request Log." The CR # should be a sequential number beginning with the last two digits of the year (e.g., 00-00#).

5. RA LE drafts TS Bases changes considering format, rules of usage, and technical adequacy, and notifies RAMs at each of the other Stations by transmitting Attachment D, "Technical Specifications Bases Change Applicability Review Form."

6. CLE reviews the agreed upon TS Bases wording changes for consistency with format, rules of usage, and technical adequacy and provides final concurrence.

7. After concurrence of the TS Bases wording changes is obtained, CLE makes an electronic version available in a working directory for use in the preparation of the 10 CFR 50.59 REVIEW and Station Qualified Review (SQR) process. The CLE shall ensure that the master electronic TS Bases files are revised per step 15 below upon receiving SQR approval. The Revision number in the footer should be a sequential number (i.e., 1, 2, etc.).

NOTE

If the TS Bases changes are applicable to more than one Station, the following steps should be performed concurrently for each Station.

8. TS Bases Change Requestor provides a 10 CFR 50.59 REVIEW for the TS Bases changes in accordance with appropriate plant procedures. An exception to this requirement applies when the changes are being requested in order to reflect an approved NRC Safety Evaluation (SE) associated with a site specific Operating License or TS change. The NRC SE is sufficient to support the changes provided it has been determined that the changes are consistent with and entirely bounded by the NRC SE. A 10 CFR 50.59 REVIEW shall be performed for TS Bases changes that reflect generic industry approval by an NRC SE to determine site specific applicability. A 10 CFR 50.59 REVIEW is not required for an EDITORIAL CHANGE.

9. TS Bases Change Requestor completes Attachment A, "Technical Specifications Bases Change Request Form," as follows:

   a. Identifies the affected sections, and includes a copy of the proposed TS Bases changes;

   b. Briefly summarizes the changes including the LCO, Action, or Surveillance Requirement to which the changes apply;

   c. Briefly summarizes the reason for the changes and attaches all supporting documentation;

   d. Identifies any schedule requirements and proposed implementation date that apply (i.e., describe any time limitations that might apply which would require expedited processing). If the changes are outage related, then checks "yes" and lists the applicable outage identifier;

   e. Identifies any known implementation requirements such as procedure changes, UFSAR changes, Passport changes, Reportability Manual revisions, pre-implementation training requirements, etc.;

   f. If a 10 CFR 50.59 REVIEW was prepared to support the TS Bases changes, the Requestor then checks the appropriate box, lists the associated 10 CFR 50.59 REVIEW Number, and attaches the original;

   g. If the changes to the TS Bases are the result of an approved NRC SE associated with a site specific Operating License or TS change and the scope of the changes determined to be consistent with and entirely bounded by the NRC SE, then the Requestor checks the appropriate box and attaches a copy;

   h. If the changes to the TS Bases are EDITORIAL CHANGES, the the Requestor checks the appropriate box and no 10 CFR 50.59 REVIEW is required;

   i. Signs and dates as Requestor and identifies the originating department;

j. Obtains approval to proceed from Department Supervisor (or designee); and

k. Returns Attachment A to the RA LE.

10. RA LE reviews the TS Bases Change Request Form, including supporting documentation, and documents the review by signing Attachment A. The review verifies that the following information or documentation is included:

a. Completed 10 CFR 50.59 REVIEW. If the changes are related to an approved NRC SE associated with a site specific Operating License or TS change and determined to be entirely bounded by the NRC SE, then only a copy of the SE is required to be attached and no 10 CFR 50.59 REVIEW is required. A 10 CFR 50.59 REVIEW is not required for an EDITORIAL CHANGE;

b. Identification of known documents requiring revisions; and

c. Completed UFSAR Change Request with supporting documentation, in accordance with appropriate plant procedures, if applicable.

11. If the TS Bases change is not an EDITORIAL CHANGE, the RA LE/TS Bases Change Requestor obtains SQR approval of the TS Bases changes by performing the following:

a. RA LE prepares the TS Bases Change SQR package. The SQR package shall include Attachment A (including completed 10 CFR 50.59 REVIEW or NRC SE) and the revised TS Bases pages. Attachment A is provided for the purpose of reviewing and finalizing the implementation requirements and ensuring the necessary actions have been initiated. RA LE shall assign Action Tracking (AT) items, as necessary, to track implementation requirements;

b. TS Bases Change Requestor submits the TS Bases Change SQR package to the SQR Committee members for a preliminary review. The SQR composition shall include RA and Operating Departments in all cases; and

c. TS Bases Change Requestor resolves preliminary review comments and finalizes the TS Bases Change SQR package.

12. The RAM shall determine the need for Plant Operations Review Committee (PORC) approval. The need for PORC approval shall be documented on Attachment A.

13. RA LE/TS Bases Change Requestor obtains PORC approval, if necessary.

14. RA LE notifies CLE of approval of the TS Bases changes by forwarding a copy of the approved SQR/PORC Change package to CLE.

15. After approval of the TS Bases changes by SQR/PORC, CLE ensures that the controlled master electronic files are updated.

16. CL/RA completes Attachment C, "Technical Specifications Bases Change Instruction Form," as follows:

    a. CLE indicates the effective date of the TS Bases changes consistent with the SQR/PORC approval or TS amendment required implementation date. If the TS Bases change is a result of a TS Amendment, the update shall be implemented coincident with implementation requirements of the TS Amendment. Otherwise, the update must be implemented by the date indicated on Attachment C;

    b. CLE lists each page to be removed and inserted, including the Affected Page List; and

    c. RA LE provides the updated master file directory for updating Electronic Document Management System (EDMS), if applicable.

17. CLE creates a TS Bases Change Package. The TS Bases Change Package shall consist of:

    a. TS Bases Change Instruction Form (Attachment C);

    b. Revised Affected Page List; and

c. Revised TS Bases pages.

One CLE shall assemble and approve the TS Bases Change Package for distribution and a second CLE shall perform a peer check to verify completeness of the TS Bases Change Package.

18. After the RA LE notifies the CLE that SQR/PORC approval of the TS Bases changes has been obtained and that all AT items assigned to track implementation requirements have been completed, CLE forwards the TS Bases Change Package to the RA LE as notification of the need to update the onsite TS Bases controlled copies and EDMS, if applicable. CLE also forwards the TS Bases Change Package to CL Records Management as notification of the need to update the offsite (CL) TS Bases controlled copies and to transmit updates to the offsite (non-CL) TS Bases controlled copies.

19. RA LE forwards the TS Bases Change Package to Station Records Management as notification of the need to update the onsite TS Bases controlled copies and EDMS, if applicable.

20. Upon completion of updating the onsite TS Bases controlled copies and EDMS (if applicable), Station Records Management Supervisor signs and dates Attachment C and returns Attachment C to the appropriate CLE.

21. Upon completion of updating the offsite (CL) TS Bases controlled copies and transmitting updates to the offsite (non-CL) TS Bases controlled copies, CL Records Management signs and dates Attachment C and returns Attachment C to the appropriate CLE.

22. CLE updates the TS Bases Change Request Log (Attachment B) with the following information:

    a. 10 CFR 50.59 REVIEW Number;

    b. SQR Number, if applicable;

    c. SQR Approval Date; and

    d. TS Bases change implementation date.

23. RA LE ensures that the documentation required to be maintained as a quality record is provided to Station Records Management for the purpose of record retention. |

1.6 ACCEPTANCE CRITERIA

Not applicable.

1.7 LCOARS/COMPENSATORY MEASURES

An Issue Report may need to be generated to provide proper tracking and resolution of noted problems associated with the implementation of this Program. |

The RAM will be responsible for ensuring that Program failures have been resolved.

1.8 REPORTING REQUIREMENTS

NOTE

TS Bases changes requiring prior NRC approval shall be submitted in accordance with Reference 5.

TS Bases changes not requiring prior NRC approval, as described in Section 1.4 of this Program, shall be submitted to the NRC in accordance with 10 CFR 50.71(e).

1.9 CHANGE CONTROL

Changes to this Program, other than EDITORIAL CHANGES, shall include a 10 CFR 50.59 REVIEW and a SQR. The SQR composition shall include RA Department in all cases. For a change to this Program, PORC approval from all Stations is required. The concurrence shall be that the other Stations are implementing the same changes or that the changes have been reviewed and determined not to be applicable to the other Stations. |

ATTACHMENT A
TECHNICAL SPECIFICATIONS BASES CHANGE REQUEST FORM

1. Change Request #: ____________ Affected Bases Section(s): ______________________

2. Description of changes: ____
____
____

3. Reason for changes (attach all supporting documentation): ______________
____
____
____

4. Schedule Requirements:
Outage Related (check one) ☐ No ☐ Yes, Outage # __________
Other (explain) ____

5. Implementation Requirements (attach additional pages, as necessary):
Identify the impact of the changes on the following:

Affected	N/A	
☐	☐	UFSAR ______________________
☐	☐	TS ______________________
☐	☐	Technical Requirements Manual ______________________
☐	☐	NRC Safety Evaluation ______________________
☐	☐	Fire Protection Report ______________________
☐	☐	NRC Commitments ______________________
☐	☐	Vendor Documentation ______________________
☐	☐	Special Permits/Licenses ______________________
☐	☐	Procedures ______________________
☐	☐	Environmental Qualification ______________________
☐	☐	Design Basis Documentation ______________________
☐	☐	Engineering Calculations ______________________
☐	☐	Drawings/Prints ______________________
☐	☐	PRA Information ______________________
☐	☐	Programs ______________________
☐	☐	Reportability Manual ______________________
☐	☐	QA Topical Report ______________________
☐	☐	Passport ______________________
☐	☐	Pre-Implementation Training Required ______________________
☐	☐	Maintenance Rule ______________________
☐	☐	Offsite Dose Calculation Manual ______________________
☐	☐	Other ______________________

6. Check one:
☐ 10 CFR 50.59 REVIEW Attached, 10 CFR 50.59 REVIEW #:____________________
☐ NRC SE Attached, Changes consistent with and entirely bounded by NRC SE
☐ EDITORIAL CHANGE, No 10 CFR 50.59 REVIEW required

7. Requestor: ____________________/____________________/____________________
(Signature) (Date) (Department)

8. Requesting Supervisor Approval: ____________________/____________________
(Signature) (Date)

9. PORC Approval Required: ☐ Yes ☐ No

10. Licensing Engineer Review: ____________________/____________________
(Signature) (Date)

ATTACHMENT B
TECHNICAL SPECIFICATIONS BASES CHANGE REQUEST LOG

CR #	Brief Description of Changes	Affected Section(s)	10 CFR 50.59 REVIEW #	SQR #	SQR Approval Date	Date Implemented

ATTACHMENT C
TECHNICAL SPECIFICATIONS BASES CHANGE INSTRUCTION FORM
FOR ONSITE/OFFSITE DISTRIBUTION AND FOR UPDATING EDMS

Braidwood/Byron/Dresden/LaSalle/QC (circle one) TS Bases Revision # ______

NOTE: This change is effective as of ____________________________ and shall be implemented by __________ . (SQR/PORC or Amendment Implementation Date)
(Date)

Approved for distribution: ________________________________/____________
(CLE Signature) (Date)

Verified: ________________________________/____________
(CLE Signature) (Date)

REMOVE Section	REMOVE Page	INSERT Section	INSERT Page	UPDATE EDMS Section	UPDATE EDMS Page
Affected Page List	All	Affected Page List	All	N/A	N/A

ATTACHMENT C
TECHNICAL SPECIFICATIONS BASES CHANGE INSTRUCTION FORM
FOR ONSITE/OFFSITE DISTRIBUTION AND FOR UPDATING EDMS

Braidwood/Byron/Dresden/LaSalle/QC (circle one) TS Bases Revision # ______

Station Records Management:

Onsite Distribution Completed: ______________________/______________
(Station Records Mgmt. Supr.) (Date)

EDMS Update Completed: ______________________/______________
(Station Records Mgmt. Supr.) (Date)

** Return this sheet to: Cantera Licensing
Braidwood/Byron/Dresden/LaSalle/QC (circle one) CL
CANTERA

CL Records Management:

Offsite (CL) Distribution Completed: ______________________/______________
(CL Records Mgmt.) (Date)

Offsite (non-CL) Distribution Transmitted: ______________________/______________
(CL Records Mgmt.) (Date)

** Return this sheet to Braidwood/Byron/Dresden/LaSalle/QC (circle one) CL

Offsite (non-CL) Controlled Copy Holders:

Offsite (non-CL) Distribution Completed: ______________________/______________
(Signature) (Date)

** Return this sheet to: EXELON GENERATION COMPANY, LLC
LICENSING AND REGULATORY AFFAIRS DEPARTMENT
4300 WINFIELD ROAD
WARRENVILLE, IL 60555

ATTACHMENT D
TECHNICAL SPECIFICATIONS BASES CHANGE APPLICABILITY REVIEW FORM

Any change to a Station's Technical Specifications (TS) Bases shall be transmitted to the Regulatory Assurance Managers (RAMs) at each of the other Stations. The RAM will review the TS Bases change for applicability at their respective Station. Review of applicability shall be documented on this Attachment and forwarded to the Regulatory Assurance Licensing Engineer(s) at the Station(s) making the change.

Braidwood/Byron/Dresden/LaSalle/QC (circle one)

TS Bases Section(s)/Title(s): ____________________

Description of the change: ____________________

____

____

____

Braidwood RAM Review: ____________________/____________
(Signature) (Date)

Change Applicable: ☐ Yes ☐ No

Byron RAM Review: ____________________/____________
(Signature) (Date)

Change Applicable: ☐ Yes ☐ No

Dresden RAM Review: ____________________/____________
(Signature) (Date)

Change Applicable: ☐ Yes ☐ No

LaSalle RAM Review: ____________________/____________
(Signature) (Date)

Change Applicable: ☐ Yes ☐ No

QC RAM Review: ____________________/____________
(Signature) (Date)

Change Applicable: ☐ Yes ☐ No

** Return this sheet to: Regulatory Assurance
Braidwood/Byron/Dresden/LaSalle/QC (circle one) Station

Core Operating Limits Report

For

Quad Cities Unit 1 Cycle 26

Prepared By: ________________ Date: 2/19/2019
Ann Hopkins – Nuclear Fuels

Reviewed By: Corie Glenn Date: 2/19/19
Corie Glenn – Nuclear Fuels

Reviewed By: ________________ Date: 2/20/2019
Christopher Staum – Engineering Safety Analysis

Reviewed By: ________________ Date: 2/20/19
Zachary Bundies – Reactor Engineering

Approved By: Armando Johnson Date: 20FEB19
Armando Johnson – NF Senior Manager

SQR By: ________________ Date: 3/11/19
Station Qualified Reviewer

SFAM Approval: ________________ Date: 3-12-19
Station Functional Area Manager

Table of Contents

Record of Quad Cities 1 Cycle 26 COLR Revisions

Revision	**Description**
14	Initial issuance for Q1C26

List of Tables

1. Terms and Definitions

AOO	Anticipated operational occurrence
ASD	Adjustable Speed Drive
CAVEX	Core average exposure
CPR	Critical power ratio
CRWE	Control rod withdrawal error
EFPD	Effective full power day
EFPH	Effective full power hour
EOCLB	End of cycle licensing basis
EOFPL	End of full power life
EOFPLB	End of full power licensing basis
EOOS	Equipment out of service
FHOOS	Feedwater heater out of service
FWT	Feedwater temperature
GWd/MTU	GigaWatt days per metric ton Uranium
ICF	Increased core flow
ISS	Intermediate scram speed
LHGR	Linear heat generation rate
$LHGRFAC_f$	Flow dependent LHGR multiplier
$LHGRFAC_p$	Power dependent LHGR multiplier
LPRM	Local power range monitor
MAPLHGR	Maximum average planar linear heat generation rate
MCPR	Minimum critical power ratio
$MCPR_f$	Flow dependent MCPR
$MCPR_p$	Power dependent MCPR
MELLLA	Maximum extended load line limit analysis
MSIVOOS	Main steam isolation valve out of service
MWd/MTU	MegaWatt days per metric ton Uranium
NEOC	Near end of cycle
NRC	Nuclear Regulatory Commission
NSS	Nominal scram speed
OLMCPR	Operating limit minimum critical power ratio
OOS	Out of service
OPRM	Oscillation power range monitor
PBDA	Period based detection algorithm
PCOOS	Pressure controller out of service
PLUOOS	Power load unbalance out of service
SLMCPR	Safety limit minimum critical power ratio
SLO	Single loop operation
TBV	Turbine bypass valve
TBVOOS	Turbine bypass valves out of service
TCV	Turbine control valve
TIP	Traversing incore probe
TLO	Two loop operation
TMOL	Thermal mechanical operating limit
TRM	Technical Requirements Manual
TSSS	Technical Specification scram speed
TSV	Turbine stop valve

2. General Information

This report is prepared in accordance with Technical Specification 5.6.5. The Q1C26 reload is licensed by Framatome. However, some legacy analyses by Westinghouse are still applicable for OPTIMA2 fuel as described in Reference 2.

Licensed rated thermal power is 2957 MWth. Rated core flow is 98 Mlb/hr. Operation up to 108% rated core flow is licensed for this cycle. For allowed operating regions, see applicable power/flow map.

The licensing analysis supports full power operation to EOCLB (37,903 MWd/MTU CAVEX). Note that this value includes coastdown, where full power operation is not expected. The transient analysis limits are provided for operation up to specific CAVEX exposures as defined in Section 4.3.

Coastdown is defined as operation beyond EOFPL with the plant power gradually reducing as available core reactivity diminishes. The Q1C26 reload analyses do not credit this reduced power during coastdown and the EOCLB limits remain valid for operation up to rated power.

Power and flow dependent limits are listed for various power and flow levels. Linear interpolation on power and flow (as applicable) is to be used to find intermediate values. Linear interpolation is also to be used for table items intentionally left blank, as indicated by boxes which are grayed out.

$MCPR_p$ for both fuel types (i.e., ATRIUM 10XM and OPTIMA2) varies with scram speed. All other thermal limits are analyzed to remain valid with NSS, ISS, and TSSS.

$LHGRFAC_f$ is independent of feedwater temperature and EOOS conditions.

For thermal limit monitoring above 100% rated power or 108% rated core flow, the 100% rated power and the 108% core flow thermal limit values, respectively, shall be used. Steady state operation is not allowed in this region. Limits are provided for transient conditions only.

3. Average Planar Linear Heat Generation Rate

Technical Specification Sections 3.2.1 and 3.4.1

Table 3-1 provides the MAPLHGR SLO multipliers for ATRIUM 10XM and OPTIMA2 fuel.

For OPTIMA2 natural uranium lattices, TLO and SLO MAPLHGR values are provided in Table 3-2. For all other OPTIMA2 lattices, lattice-specific MAPLHGR values for TLO are provided in Tables 3-3 through 3-21. For ATRIUM 10XM fuel, the lattice-specific MAPLHGR limits for TLO can be found in Tables 3-22 through 3-24.

During SLO, the limits in Tables 3-3 through 3-24 are multiplied by the fuel-specific SLO multiplier listed in Table 3-1. The ATRIUM 10XM multiplier may be applied to OPTIMA2 for SLO conditions, as the ATRIUM 10XM multiplier is more limiting.

Table 3-1: MAPLHGR SLO Multipliers
(References 2 and 5)

Fuel Type	Multiplier
ATRIUM 10XM	0.80
OPTIMA2	0.86

Table 3-2: MAPLHGR for OPTIMA2 Lattices 101 and 108
(References 5 and 7)

All OPTIMA2 Bundles Lattices 101: Opt2-B0.71 108: Opt2-T0.71	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	7.65
75.0	7.65

Table 3-3: MAPLHGR for OPTIMA2 Lattice 171
(References 5 and 7)

Bundle Opt2-4.03-16GZ8.00/5.50-2GZ5.50 (QM24) Lattice 171: Opt2-B4.33-16G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.08
2.5	9.42
5.0	9.34
7.5	9.51
10.0	9.72
12.0	9.86
15.0	10.08
17.0	10.19
20.0	10.38
22.0	10.39
24.0	10.39
30.0	10.19
36.0	10.05
42.0	9.93
50.0	9.83
75.0	9.83

Table 3-4: MAPLHGR for OPTIMA2 Lattice 172
(References 5 and 7)

Bundle Opt2-4.03-16GZ8.00/5.50-2GZ5.50 (QM24) Lattice 172: Opt2-B4.47-16G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.01
2.5	9.35
5.0	9.26
7.5	9.23
10.0	9.38
12.0	9.46
15.0	9.60
17.0	9.66
20.0	9.79
22.0	9.90
24.0	10.02
30.0	10.02
36.0	9.98
42.0	9.94
50.0	9.95
75.0	9.95

Table 3-5: MAPLHGR for OPTIMA2 Lattice 173
(References 5 and 7)

Bundle Opt2-4.03-16GZ8.00/5.50-2GZ5.50 (QM24) Lattice 173: Opt2-BE4.56-16G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.04
2.5	9.36
5.0	9.26
7.5	9.25
10.0	9.44
12.0	9.53
15.0	9.68
17.0	9.75
20.0	9.90
22.0	10.01
24.0	10.15
30.0	10.11
36.0	10.08
42.0	10.02
50.0	9.98
75.0	9.98

Table 3-6: MAPLHGR for OPTIMA2 Lattice 174
(References 5 and 7)

Bundle Opt2-4.03-16GZ8.00/5.50-2GZ5.50 (QM24) Lattice 174: Opt2-M4.56-16G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.02
2.5	9.36
5.0	9.25
7.5	9.26
10.0	9.44
12.0	9.54
15.0	9.69
17.0	9.76
20.0	9.92
22.0	10.02
24.0	10.16
30.0	10.10
36.0	10.07
42.0	10.01
50.0	9.94
75.0	9.94

Table 3-7: MAPLHGR for OPTIMA2 Lattice 175
(References 5 and 7)

Bundle Opt2-4.03-16GZ8.00/5.50-2GZ5.50 (QM24) Lattice 175: Opt2-ME4.52-16G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.15
2.5	9.50
5.0	9.39
7.5	9.41
10.0	9.59
12.0	9.70
15.0	9.86
17.0	9.96
20.0	10.21
22.0	10.38
24.0	10.35
30.0	10.31
36.0	10.25
42.0	10.19
50.0	10.06
75.0	10.06

Table 3-8: MAPLHGR for OPTIMA2 Lattice 176
(References 5 and 7)

Bundle Opt2-4.03-16GZ8.00/5.50-2GZ5.50 (QM24) Lattice 176: Opt2-T4.52-16G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.20
2.5	9.53
5.0	9.42
7.5	9.40
10.0	9.56
12.0	9.66
15.0	9.80
17.0	9.88
20.0	10.20
22.0	10.39
24.0	10.34
30.0	10.31
36.0	10.24
42.0	10.13
50.0	10.03
75.0	10.03

Table 3-9: MAPLHGR for OPTIMA2 Lattice 177
(References 5 and 7)

Bundle Opt2-4.03-16GZ8.00/5.50-2GZ5.50 (QM24) Lattice 177: Opt2-T4.53-16G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.63
2.5	9.98
5.0	9.93
7.5	9.71
10.0	9.82
12.0	9.92
15.0	10.19
17.0	10.39
20.0	10.45
22.0	10.44
24.0	10.40
30.0	10.35
36.0	10.28
42.0	10.23
50.0	10.11
75.0	10.11

Table 3-10: MAPLHGR for OPTIMA2 Lattice 178
(References 5 and 7)

Bundle Opt2-4.03-14GZ8.00/5.50-2GZ5.50 (QN24) Lattice 178: Opt2-B4.33-14G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.36
2.5	9.68
5.0	9.56
7.5	9.64
10.0	9.77
12.0	9.94
15.0	10.13
17.0	10.22
20.0	10.34
22.0	10.36
24.0	10.38
30.0	10.18
36.0	10.03
42.0	9.90
50.0	9.80
75.0	9.80

Table 3-11: MAPLHGR for OPTIMA2 Lattice 179
(References 5 and 7)

Bundle Opt2-4.03-14GZ8.00/5.50-2GZ5.50 (QN24) Lattice 179: Opt2-B4.46-14G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.29
2.5	9.59
5.0	9.49
7.5	9.38
10.0	9.46
12.0	9.54
15.0	9.66
17.0	9.70
20.0	9.76
22.0	9.87
24.0	9.98
30.0	10.02
36.0	9.98
42.0	9.93
50.0	9.90
75.0	9.90

Table 3-12: MAPLHGR for OPTIMA2 Lattice 180
(References 5 and 7)

Bundle Opt2-4.03-14GZ8.00/5.50-2GZ5.50 (QN24) Lattice 180: Opt2-BE4.55-14G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.32
2.5	9.62
5.0	9.48
7.5	9.43
10.0	9.56
12.0	9.61
15.0	9.74
17.0	9.79
20.0	9.86
22.0	9.98
24.0	10.11
30.0	10.11
36.0	10.08
42.0	10.00
50.0	9.91
75.0	9.91

Table 3-13: MAPLHGR for OPTIMA2 Lattice 181
(References 5 and 7)

Bundle Opt2-4.03-14GZ8.00/5.50-2GZ5.50 (QN24) Lattice 181: Opt2-M4.55-14G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.31
2.5	9.62
5.0	9.53
7.5	9.47
10.0	9.57
12.0	9.63
15.0	9.75
17.0	9.80
20.0	9.87
22.0	10.00
24.0	10.12
30.0	10.10
36.0	10.07
42.0	10.00
50.0	9.84
75.0	9.84

Table 3-14: MAPLHGR for OPTIMA2 Lattice 182
(References 5 and 7)

Bundle Opt2-4.03-14GZ8.00/5.50-2GZ5.50 (QN24) Lattice 182: Opt2-ME4.51-14G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.46
2.5	9.78
5.0	9.66
7.5	9.61
10.0	9.73
12.0	9.80
15.0	9.93
17.0	9.98
20.0	10.14
22.0	10.32
24.0	10.36
30.0	10.31
36.0	10.27
42.0	10.16
50.0	10.06
75.0	10.06

Table 3-15: MAPLHGR for OPTIMA2 Lattice 183
(References 5 and 7)

Bundle Opt2-4.03-14GZ8.00/5.50-2GZ5.50 (QN24) Lattice 183: Opt2-T4.51-14G8.00-2G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.51
2.5	9.82
5.0	9.69
7.5	9.59
10.0	9.71
12.0	9.77
15.0	9.89
17.0	9.94
20.0	10.17
22.0	10.36
24.0	10.34
30.0	10.32
36.0	10.24
42.0	10.12
50.0	9.96
75.0	9.96

Table 3-16: MAPLHGR for OPTIMA2 Lattice 184
(References 5 and 7)

Bundle Opt2-4.03-14GZ8.00/5.50-2GZ5.50 (QN24) Lattice 184: Opt2-T4.52-14G5.50	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.98
2.5	10.25
5.0	10.18
7.5	9.89
10.0	9.90
12.0	10.01
15.0	10.18
17.0	10.36
20.0	10.45
22.0	10.46
24.0	10.42
30.0	10.37
36.0	10.30
42.0	10.22
50.0	10.04
75.0	10.04

Table 3-17: MAPLHGR for OPTIMA2 Lattice 185
(References 5 and 7)

Bundle Opt2-4.16-12G6.00-2GZ6.00 (QO24) Lattice 185: Opt2-B4.58-14G6.00	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.31
2.5	9.51
5.0	9.45
7.5	9.46
10.0	9.50
12.0	9.56
15.0	9.67
17.0	9.75
20.0	9.87
22.0	9.97
24.0	9.99
30.0	10.01
36.0	10.03
42.0	10.01
50.0	9.99
75.0	9.99

Table 3-18: MAPLHGR for OPTIMA2 Lattice 186
(References 5 and 7)

Bundle Opt2-4.16-12G6.00-2GZ6.00 (QO24) Lattice 186: Opt2-BE4.67-14G6.00	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.34
2.5	9.56
5.0	9.49
7.5	9.52
10.0	9.67
12.0	9.65
15.0	9.75
17.0	9.85
20.0	9.99
22.0	10.08
24.0	10.11
30.0	10.15
36.0	10.14
42.0	10.09
50.0	10.02
75.0	10.02

Table 3-19: MAPLHGR for OPTIMA2 Lattice 187
(References 5 and 7)

Bundle Opt2-4.16-12G6.00-2GZ6.00 (QO24) Lattice 187: Opt2-M4.67-14G6.00	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.32
2.5	9.57
5.0	9.47
7.5	9.51
10.0	9.70
12.0	9.66
15.0	9.76
17.0	9.86
20.0	10.05
22.0	10.09
24.0	10.11
30.0	10.17
36.0	10.13
42.0	10.08
50.0	9.99
75.0	9.99

Table 3-20: MAPLHGR for OPTIMA2 Lattice 188
(References 5 and 7)

Bundle Opt2-4.16-12G6.00-2GZ6.00 (QO24) Lattice 188: Opt2-ME4.64-14G6.00	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.51
2.5	9.75
5.0	9.67
7.5	9.71
10.0	9.80
12.0	9.84
15.0	9.98
17.0	10.13
20.0	10.31
22.0	10.37
24.0	10.38
30.0	10.41
36.0	10.37
42.0	10.32
50.0	10.16
75.0	10.16

Table 3-21: MAPLHGR for OPTIMA2 Lattice 189
(References 5 and 7)

Bundle Opt2-4.16-12G6.00-2GZ6.00 (QO24) Lattice 189: Opt2-T4.64-12G6.00	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	9.91
2.5	10.14
5.0	9.98
7.5	10.01
10.0	9.98
12.0	9.96
15.0	10.07
17.0	10.16
20.0	10.31
22.0	10.37
24.0	10.37
30.0	10.37
36.0	10.38
42.0	10.31
50.0	10.13
75.0	10.13

Table 3-22: MAPLHGR for ATRIUM 10XM Bottom Lattices
(References 2 and 4)

All ATRIUM 10XM Bundles Lattices XMLCP-0720L-0G0, XMLCB-0720L-0G0, XMLCB-4475L-16GV80, XMLCB-4487L-14GV80, XMLCB-4487L-14G80, XMLCB-4499L-12GV80, XMLCB-4538L-17G80, XMLCB-4538L-17GV80, XMLCB-4538L-17GV80A, XMLCB-4556L-17G80, XMLCB-4561L-16GV80, XMLCB-4642L-13G80, XMLCB-0720L-0G0a, XMLCP-0720L-0G0a	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	11.70
20.0	11.70
67.0	6.60

Table 3-23: MAPLHGR for ATRIUM 10XM Top Lattices
(References 2 and 4)

All ATRIUM 10XM Bundles Lattices XMLCT-0720L-0G0d, XMLCT-0720L-0G0, XMLCT-4355L-12G30, XMLCT-4523L-14G80, XMLCTP-4523L-14G80, XMLCT-4530L-12GV80, XMLCTP-4530L-12GV80, XMLCT-0720L-0G0da, XMLCT-0720L-0G0a, XMLCT-4602L-16GV65A, XMLCT-4602L-16GV65, XMLCT-4721L-12G65, XMLCT-4715L-13G80, XMLCTP-4715L-13G80	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	11.70
15.0	11.60
20.0	11.21
67.0	6.60

Table 3-24: MAPLHGR for ATRIUM 10XM Top Lattices XMLCT-4596L-17G80 and XMLCTP-4596L-17G80
(References 2 and 4)

ATRIUM 10XM Bundles XMLC-4070B-17GV80, XMLC-4081B-17GV80 Lattices XMLCT-4596L-17G80, XMLCTP-4596L-17G80	
Avg. Planar Exposure (GWd/MTU)	**TLO MAPLHGR (kW/ft)**
0.0	11.70
15.0	11.44
20.0	11.21
67.0	6.60

4. Operating Limit Minimum Critical Power Ratio

Technical Specification Sections 3.2.2, 3.4.1, and 3.7.7

The OLMCPRs for Q1C26 are established so that less than 0.1% of the fuel rods in the core are expected to experience boiling transition during an AOO initiated from rated or off-rated conditions and support current Technical Specifications SLMCPR values (Reference 2).

Tables 4-3 through 4-27 include MCPR limits for various specified EOOS conditions. The EOOS conditions separated by “/” in these tables represent single EOOS conditions and not any combination of conditions. Refer to Section 8 for a detailed explanation of allowable EOOS conditions.

4.1. Manual Flow Control MCPR Limits

The OLMCPR is determined for a given power and flow condition by evaluating the power-dependent MCPR and the flow-dependent MCPR and selecting the greater of the two.

4.1.1. Power-Dependent MCPR

The OLMCPR as a function of core thermal power ($MCPR_p$) is shown in Tables 4-3 through 4-26. $MCPR_p$ limits are dependent on scram times as described in Section 4.2, exposure as described in Section 4.3, fuel type, FWT, and whether the plant is in TLO or SLO. TLO limits for ATRIUM 10XM fuel are given in Tables 4-3 through 4-11 and SLO limits for ATRIUM 10XM fuel are given in Tables 4-21 through 4-23. TLO limits for OPTIMA2 fuel are given in Tables 4-12 through 4-20 and SLO limits for OPTIMA2 fuel are given in Tables 4-24 through 4-26.

4.1.2. Flow-Dependent MCPR

Table 4-27 gives the OLMCPR limit as a function of the flow ($MCPR_f$) based on the applicable plant condition. These values are applicable to both ATRIUM 10XM and OPTIMA2 fuel.

4.2. Scram Time

TSSS, ISS, and NSS refer to scram speeds. The scram time values associated with these speeds are shown in Table 4-1. The TSSS scram times shown in Table 4-1 are the same as those specified in the Technical Specifications (Reference 8).

To utilize the OLMCPR limits for NSS in Tables 4-3, 4-6, 4-9, 4-12, 4-15, 4-18, 4-21, and 4-24, the average control rod insertion time at each control rod insertion fraction must be equal to or less than the NSS time shown in Table 4-1 below.

To utilize the OLMCPR limits for ISS in Tables 4-4, 4-7, 4-10, 4-13, 4-16, 4-19, 4-22, and 4-25, the average control rod insertion time at each control rod insertion fraction must be equal to or less than the ISS time shown in Table 4-1 below.

The “Average Control Rod Insertion Time” is defined as the sum of the control rod insertion times of all operable control rods divided by the number of operable control rods. Conservative adjustments to the NSS and ISS scram speeds were made to the analysis inputs to appropriately account for the effects of 1 stuck control rod and one additional control rod that is assumed to fail to scram (Reference 2).

To utilize the OLMCPR limits for TSSS in Tables 4-5, 4-8, 4-11, 4-14, 4-17, 4-20, 4-23, and 4-26, the control rod insertion time of each operable control rod at each control rod insertion fraction must be less than or equal to the TSSS time shown in Table 4-1. The Technical Specifications allow operation with up to 12 “slow” and 1 stuck control rod. One additional control rod is assumed to fail to scram for the system transient analyses performed to establish $MCPR_p$ limits (Reference 2). Conservative adjustments to the TSSS scram speeds were made to the analysis inputs to appropriately account for the effects of the slow and stuck rods on scram reactivity (Reference 2).

For cases below 38.5% power (P_{bypass}), the results are relatively insensitive to scram speed, and only TSSS analyses were performed (Reference 2).

Table 4-1: Scram Times
(References 2 and 8)

Control Rod Insertion Fraction (%)	NSS (seconds)	ISS (seconds)	TSSS (seconds)
5	0.324	0.360	0.48
20	0.694	0.720	0.89
50	1.510	1.580	1.98
90	2.670	2.800	3.44

4.3. Exposure Dependent MCPR Limits

Exposure-dependent $MCPR_p$ limits were established to support operation for the entire cycle duration. Note that the thermal limits are based on CAVEX. The CAVEX values at which point the $MCPR_p$ limits are required to be changed are shown in Table 4-2 below. The limits at a later exposure range can be used earlier in the cycle as they are the same or more conservative.

Table 4-2: Exposure Basis for Transient Analysis
(Reference 2)

Core Average Exposure (MWd/MTU)	Description
34,887	Break point for exposure-dependent $MCPR_p$ limits (NEOC)
37,398	Design basis rod patterns to EOFPL + 25 EFPD (EOFPLB)
37,903	EOCLB – Maximum licensing core exposure, including coastdown

4.4. Recirculation Pump ASD Settings

Technical Requirement Manual 2.1.a.1

Quad Cities 1 Cycle 26 was analyzed with a slow flow excursion event assuming a failure of the recirculation flow control system such that the core flow increases slowly to the maximum flow physically permitted by the equipment, assumed to be 112% of rated core flow (Reference 2); therefore the recirculation pump ASD must be set to maintain core flow less than 112% (109.76 Mlb/hr) for all runout events.

Table 4-3: ATRIUM 10XM TLO $MCPR_p$ Limits for NSS Insertion Times, BOC to NEOC (34,887 MWd/MTU CAVEX)

(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.16	1.94		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.36	3.36	2.61	1.99		1.51
	> 60	3.42	3.42	2.75			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.58	2.58	2.23	2.05		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.46	3.46	2.68	2.09		1.51
	> 60	3.53	3.53	2.83			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.58	2.58	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			

Table 4-4: ATRIUM 10XM TLO MCPR$_p$ Limits for ISS Insertion Times, BOC to NEOC (34,887 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT

EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.16	1.94		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.36	3.36	2.61	1.99		1.51
	> 60	3.42	3.42	2.75			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			

FHOOS

EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.58	2.58	2.23	2.06		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.46	3.46	2.68	2.10		1.51
	> 60	3.53	3.53	2.83			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.58	2.58	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			

Table 4-5: ATRIUM 10XM TLO $MCPR_p$ Limits for TSSS Insertion Times, BOC to NEOC (34,887 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.16	1.97		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.36	3.36	2.61	2.02		1.51
	> 60	3.42	3.42	2.75			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.35	2.35	1.97	1.50
	> 60	2.72	2.72	2.35			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.58	2.58	2.23	2.12		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.46	3.46	2.68	2.12		1.51
	> 60	3.53	3.53	2.83			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.58	2.58	2.35	2.35	1.97	1.50
	> 60	2.72	2.72	2.35			

Table 4-6: ATRIUM 10XM TLO MCPR$_p$ Limits for NSS Insertion Times, NEOC to EOFPLB (37,398 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.16	1.94		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.36	3.36	2.61	1.99		1.51
	> 60	3.42	3.42	2.75			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.58	2.58	2.23	2.05		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.46	3.46	2.68	2.09		1.51
	> 60	3.53	3.53	2.83			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.58	2.58	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			

Table 4-7: ATRIUM 10XM TLO $MCPR_p$ Limits for ISS Insertion Times, NEOC to EOFPLB (37,398 MWd/MTU CAVEX)

(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.16	1.94		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.36	3.36	2.61	1.99		1.51
	> 60	3.42	3.42	2.75			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.58	2.58	2.23	2.06		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.46	3.46	2.68	2.10		1.51
	> 60	3.53	3.53	2.83			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.58	2.58	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			

Table 4-8: ATRIUM 10XM TLO $MCPR_p$ Limits for TSSS Insertion Times, NEOC to EOFPLB (37,398 MWd/MTU CAVEX)
(Reference 2)

<table>
<tr><th colspan="8">Nominal FWT</th></tr>
<tr><th rowspan="2">EOOS Condition</th><th rowspan="2">Core Flow (% rated)</th><th colspan="6">Core Power (% rated)</th></tr>
<tr><th>0</th><th>25</th><th>≤ 38.5</th><th>> 38.5</th><th>75</th><th>100</th></tr>
<tr><td rowspan="2">Base/TCV Stuck Closed/MSIVOOS</td><td>≤ 60</td><td>2.52</td><td>2.52</td><td>2.16</td><td rowspan="2">1.97</td><td rowspan="2"></td><td rowspan="2">1.50</td></tr>
<tr><td>> 60</td><td>2.72</td><td>2.72</td><td>2.35</td></tr>
<tr><td rowspan="2">TBVOOS</td><td>≤ 60</td><td>3.36</td><td>3.36</td><td>2.61</td><td rowspan="2">2.02</td><td rowspan="2"></td><td rowspan="2">1.51</td></tr>
<tr><td>> 60</td><td>3.42</td><td>3.42</td><td>2.75</td></tr>
<tr><td rowspan="2">TCV Slow Closure/ PLUOOS/PCOOS</td><td>≤ 60</td><td>2.53</td><td>2.53</td><td>2.35</td><td rowspan="2">2.35</td><td rowspan="2">1.97</td><td rowspan="2">1.50</td></tr>
<tr><td>> 60</td><td>2.72</td><td>2.72</td><td>2.35</td></tr>
<tr><th colspan="8">FHOOS</th></tr>
<tr><th rowspan="2">EOOS Condition</th><th rowspan="2">Core Flow (% rated)</th><th colspan="6">Core Power (% rated)</th></tr>
<tr><th>0</th><th>25</th><th>≤ 38.5</th><th>> 38.5</th><th>75</th><th>100</th></tr>
<tr><td rowspan="2">Base/TCV Stuck Closed/MSIVOOS</td><td>≤ 60</td><td>2.58</td><td>2.58</td><td>2.23</td><td rowspan="2">2.12</td><td rowspan="2"></td><td rowspan="2">1.50</td></tr>
<tr><td>> 60</td><td>2.72</td><td>2.72</td><td>2.35</td></tr>
<tr><td rowspan="2">TBVOOS</td><td>≤ 60</td><td>3.46</td><td>3.46</td><td>2.68</td><td rowspan="2">2.12</td><td rowspan="2"></td><td rowspan="2">1.51</td></tr>
<tr><td>> 60</td><td>3.53</td><td>3.53</td><td>2.83</td></tr>
<tr><td rowspan="2">TCV Slow Closure/ PLUOOS/PCOOS</td><td>≤ 60</td><td>2.58</td><td>2.58</td><td>2.35</td><td rowspan="2">2.35</td><td rowspan="2">1.97</td><td rowspan="2">1.50</td></tr>
<tr><td>> 60</td><td>2.72</td><td>2.72</td><td>2.35</td></tr>
</table>

Table 4-9: ATRIUM 10XM TLO MCPR$_p$ Limits for NSS Insertion Times, EOFPLB to EOCLB (37,903 MWd/MTU CAVEX)

(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.16	1.94		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.36	3.36	2.61	1.99		1.51
	> 60	3.42	3.42	2.75			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.58	2.58	2.23	2.05		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.46	3.46	2.68	2.09		1.51
	> 60	3.53	3.53	2.83			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.58	2.58	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			

Table 4-10: ATRIUM 10XM TLO $MCPR_p$ Limits for ISS Insertion Times, EOFPLB to EOCLB (37,903 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.16	1.94		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.36	3.36	2.61	1.99		1.51
	> 60	3.42	3.42	2.75			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.58	2.58	2.23	2.06		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.46	3.46	2.68	2.10		1.51
	> 60	3.53	3.53	2.83			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.58	2.58	2.33	2.33	1.95	1.50
	> 60	2.72	2.72	2.35			

Table 4-11: ATRIUM 10XM TLO $MCPR_p$ Limits for TSSS Insertion Times, EOFPLB to EOCLB (37,903 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	75	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.16	1.97		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.36	3.36	2.61	2.02		1.51
	> 60	3.42	3.42	2.75			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.35	2.35	1.97	1.50
	> 60	2.72	2.72	2.35			
FHOOS							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	75	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.58	2.58	2.23	2.12		1.50
	> 60	2.72	2.72	2.35			
TBVOOS	≤ 60	3.46	3.46	2.68	2.12		1.51
	> 60	3.53	3.53	2.83			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.58	2.58	2.35	2.35	1.97	1.50
	> 60	2.72	2.72	2.35			

Table 4-12: OPTIMA2 TLO $MCPR_p$ Limits for NSS Insertion Times, BOC to NEOC (34,887 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.42	2.42	2.10	1.94		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.25	3.25	2.50	2.01		1.57
	> 60	3.47	3.47	2.80			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.42	2.42	2.38	2.38	1.99	1.52
	> 60	2.77	2.77	2.40			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.53	2.53	2.13	2.09		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.36	3.36	2.58	2.12		1.57
	> 60	3.54	3.54	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.38	2.38	1.99	1.52
	> 60	2.77	2.77	2.40			

Table 4-13: OPTIMA2 TLO $MCPR_p$ Limits for ISS Insertion Times, BOC to NEOC (34,887 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.42	2.42	2.10	1.95		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.25	3.25	2.50	2.02		1.57
	> 60	3.47	3.47	2.80			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.42	2.42	2.38	2.38	1.99	1.52
	> 60	2.77	2.77	2.40			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.53	2.53	2.13	2.10		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.36	3.36	2.58	2.12		1.57
	> 60	3.54	3.54	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.38	2.38	1.99	1.52
	> 60	2.77	2.77	2.40			

Table 4-14: OPTIMA2 TLO $MCPR_p$ Limits for TSSS Insertion Times, BOC to NEOC (34,887 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.42	2.42	2.10	2.00		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.25	3.25	2.50	2.05		1.57
	> 60	3.47	3.47	2.80			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.42	2.42	2.40	2.40	2.01	1.52
	> 60	2.77	2.77	2.40			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.53	2.53	2.14	2.14		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.36	3.36	2.58	2.17		1.57
	> 60	3.54	3.54	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.40	2.40	2.01	1.52
	> 60	2.77	2.77	2.40			

Table 4-15: OPTIMA2 TLO $MCPR_p$ Limits for NSS Insertion Times, NEOC to EOFPLB (37,398 MWd/MTU CAVEX)
(Reference 2)

<table>
<tr><th colspan="8">Nominal FWT</th></tr>
<tr><th rowspan="2">EOOS Condition</th><th rowspan="2">Core Flow (% rated)</th><th colspan="6">Core Power (% rated)</th></tr>
<tr><th>0</th><th>25</th><th>≤ 38.5</th><th>> 38.5</th><th>75</th><th>100</th></tr>
<tr><td rowspan="2">Base/TCV Stuck Closed/MSIVOOS</td><td>≤ 60</td><td>2.42</td><td>2.42</td><td>2.10</td><td rowspan="2">1.94</td><td rowspan="2"></td><td rowspan="2">1.52</td></tr>
<tr><td>> 60</td><td>2.77</td><td>2.77</td><td>2.40</td></tr>
<tr><td rowspan="2">TBVOOS</td><td>≤ 60</td><td>3.25</td><td>3.25</td><td>2.50</td><td rowspan="2">2.01</td><td rowspan="2"></td><td rowspan="2">1.57</td></tr>
<tr><td>> 60</td><td>3.47</td><td>3.47</td><td>2.80</td></tr>
<tr><td rowspan="2">TCV Slow Closure/ PLUOOS/PCOOS</td><td>≤ 60</td><td>2.42</td><td>2.42</td><td>2.38</td><td rowspan="2">2.38</td><td rowspan="2">1.99</td><td rowspan="2">1.52</td></tr>
<tr><td>> 60</td><td>2.77</td><td>2.77</td><td>2.40</td></tr>
<tr><th colspan="8">FHOOS</th></tr>
<tr><th rowspan="2">EOOS Condition</th><th rowspan="2">Core Flow (% rated)</th><th colspan="6">Core Power (% rated)</th></tr>
<tr><th>0</th><th>25</th><th>≤ 38.5</th><th>> 38.5</th><th>75</th><th>100</th></tr>
<tr><td rowspan="2">Base/TCV Stuck Closed/MSIVOOS</td><td>≤ 60</td><td>2.53</td><td>2.53</td><td>2.13</td><td rowspan="2">2.09</td><td rowspan="2"></td><td rowspan="2">1.52</td></tr>
<tr><td>> 60</td><td>2.77</td><td>2.77</td><td>2.40</td></tr>
<tr><td rowspan="2">TBVOOS</td><td>≤ 60</td><td>3.36</td><td>3.36</td><td>2.58</td><td rowspan="2">2.12</td><td rowspan="2"></td><td rowspan="2">1.57</td></tr>
<tr><td>> 60</td><td>3.54</td><td>3.54</td><td>2.86</td></tr>
<tr><td rowspan="2">TCV Slow Closure/ PLUOOS/PCOOS</td><td>≤ 60</td><td>2.53</td><td>2.53</td><td>2.38</td><td rowspan="2">2.38</td><td rowspan="2">1.99</td><td rowspan="2">1.52</td></tr>
<tr><td>> 60</td><td>2.77</td><td>2.77</td><td>2.40</td></tr>
</table>

Table 4-16: OPTIMA2 TLO $MCPR_p$ Limits for ISS Insertion Times, NEOC to EOFPLB (37,398 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.42	2.42	2.10	1.95		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.25	3.25	2.50	2.02		1.57
	> 60	3.47	3.47	2.80			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.42	2.42	2.38	2.38	1.99	1.52
	> 60	2.77	2.77	2.40			
FHOOS								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.53	2.53	2.13	2.10		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.36	3.36	2.58	2.12		1.57
	> 60	3.54	3.54	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.38	2.38	1.99	1.52
	> 60	2.77	2.77	2.40			

Table 4-17: OPTIMA2 TLO $MCPR_p$ Limits for TSSS Insertion Times, NEOC to EOFPLB (37,398 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.42	2.42	2.10	2.00		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.25	3.25	2.50	2.05		1.57
	> 60	3.47	3.47	2.80			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.42	2.42	2.40	2.40	2.01	1.52
	> 60	2.77	2.77	2.40			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.53	2.53	2.14	2.14		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.36	3.36	2.58	2.17		1.57
	> 60	3.54	3.54	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.40	2.40	2.01	1.52
	> 60	2.77	2.77	2.40			

Table 4-18: OPTIMA2 TLO $MCPR_p$ Limits for NSS Insertion Times, EOFPLB to EOCLB (37,903 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.42	2.42	2.10	1.94		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.25	3.25	2.50	2.01		1.57
	> 60	3.47	3.47	2.80			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.42	2.42	2.38	2.38	1.99	1.52
	> 60	2.77	2.77	2.40			
FHOOS								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.53	2.53	2.13	2.09		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.36	3.36	2.58	2.12		1.57
	> 60	3.54	3.54	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.38	2.38	1.99	1.52
	> 60	2.77	2.77	2.40			

Table 4-19: OPTIMA2 TLO $MCPR_p$ Limits for ISS Insertion Times, EOFPLB to EOCLB (37,903 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.42	2.42	2.10	1.95		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.25	3.25	2.50	2.02		1.57
	> 60	3.47	3.47	2.80			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.42	2.42	2.38	2.38	1.99	1.52
	> 60	2.77	2.77	2.40			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.53	2.53	2.13	2.10		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.36	3.36	2.58	2.12		1.57
	> 60	3.54	3.54	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.38	2.38	1.99	1.52
	> 60	2.77	2.77	2.40			

Table 4-20: OPTIMA2 TLO $MCPR_p$ Limits for TSSS Insertion Times, EOFPLB to EOCLB (37,903 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.42	2.42	2.10	2.00		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.25	3.25	2.50	2.05		1.57
	> 60	3.47	3.47	2.80			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.42	2.42	2.40	2.40	2.01	1.52
	> 60	2.77	2.77	2.40			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**75**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.53	2.53	2.14	2.14		1.52
	> 60	2.77	2.77	2.40			
TBVOOS	≤ 60	3.36	3.36	2.58	2.17		1.57
	> 60	3.54	3.54	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.53	2.53	2.40	2.40	2.01	1.52
	> 60	2.77	2.77	2.40			

Table 4-21: ATRIUM 10XM SLO $MCPR_p$ Limits for NSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.55	2.55	2.19	2.09	2.06
TBVOOS	3.39	3.39	2.64	2.09	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.56	2.56	2.36	2.36	2.25
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.61	2.61	2.26	2.09	2.06
TBVOOS	3.49	3.49	2.71	2.12	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.61	2.61	2.36	2.36	2.25

Table 4-22: ATRIUM 10XM SLO $MCPR_p$ Limits for ISS Insertion Times, All Exposures
(Reference 2)

EOOS Condition (all include SLO)	Core Power (% rated)				
Nominal FWT					
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.55	2.55	2.19	2.09	2.06
TBVOOS	3.39	3.39	2.64	2.09	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.56	2.56	2.36	2.36	2.25
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.61	2.61	2.26	2.09	2.06
TBVOOS	3.49	3.49	2.71	2.13	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.61	2.61	2.36	2.36	2.25

Table 4-23: ATRIUM 10XM SLO $MCPR_p$ Limits for TSSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.55	2.55	2.19	2.09	2.06
TBVOOS	3.39	3.39	2.64	2.09	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.56	2.56	2.38	2.38	2.27
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.61	2.61	2.26	2.15	2.06
TBVOOS	3.49	3.49	2.71	2.15	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.61	2.61	2.38	2.38	2.27

Table 4-24: OPTIMA2 SLO $MCPR_p$ Limits for NSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.45	2.45	2.13	2.11	2.08
TBVOOS	3.28	3.28	2.53	2.11	2.08
TCV Slow Closure/ PLUOOS/PCOOS	2.45	2.45	2.41	2.41	2.29
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.56	2.56	2.16	2.12	2.08
TBVOOS	3.39	3.39	2.61	2.15	2.08
TCV Slow Closure/ PLUOOS/PCOOS	2.56	2.56	2.41	2.41	2.29

Table 4-25: OPTIMA2 SLO $MCPR_p$ Limits for ISS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.45	2.45	2.13	2.11	2.08
TBVOOS	3.28	3.28	2.53	2.11	2.08
TCV Slow Closure/ PLUOOS/PCOOS	2.45	2.45	2.41	2.41	2.29
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.56	2.56	2.16	2.13	2.08
TBVOOS	3.39	3.39	2.61	2.15	2.08
TCV Slow Closure/ PLUOOS/PCOOS	2.56	2.56	2.41	2.41	2.29

Table 4-26: OPTIMA2 SLO $MCPR_p$ Limits for TSSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.45	2.45	2.13	2.11	2.08
TBVOOS	3.28	3.28	2.53	2.11	2.08
TCV Slow Closure/ PLUOOS/PCOOS	2.45	2.45	2.43	2.43	2.31
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.56	2.56	2.17	2.17	2.08
TBVOOS	3.39	3.39	2.61	2.20	2.09
TCV Slow Closure/ PLUOOS/PCOOS	2.56	2.56	2.43	2.43	2.31

Table 4-27: ATRIUM 10XM and OPTIMA2 $MCPR_f$ Limits
(Reference 2)

EOOS Condition*	Core Flow (% rated)	$MCPR_f$ Limit
Base Case / FHOOS / PCOOS / PLUOOS / TCV Slow Closure / PLUOOS and PCOOS in TLO and SLO	0	1.70
	35	1.70
	108	1.18
Any Scenario** with One MSIVOOS	0	1.81
	35	1.81
	108	1.18
Any Scenario** with TBVOOS	0	1.90
	35	1.90
	108	1.35
Any Scenario** with 1 Stuck Closed TCV/TSV	0	1.70
	35	1.70
	108	1.18

* See Section 8 for further operating restrictions.
** "Any Scenario" includes any other combination of allowable EOOS conditions that is not otherwise covered by this table.

Note that the $MCPR_f$ limits for any scenario with 1 stuck closed TCV/TSV are identical to base case $MCPR_f$ limits. This is reflected in the thermal limit sets presented in Table 8-1.

5. Linear Heat Generation Rate

Technical Specification Sections 3.2.3, 3.4.1, and 3.7.7

The TMOL at rated conditions for the OPTIMA2 and ATRIUM 10XM fuel is established in terms of the maximum LHGR as a function of rod nodal (peak pellet) exposure. The LHGR limits for OPTIMA2 fuel are presented in Tables 5-1 through 5-5. The limits in Table 5-1 apply to OPTIMA2 natural blanket lattices (lattice types 101 and 108). The limits in Tables 5-2 through 5-5 apply to non-natural blanket OPTIMA2 lattices that require Gadolinia set down penalties. The LHGR limits for ATRIUM 10XM fuel are presented in Table 5-6.

The power- and flow-dependent LHGR multipliers ($LHGRFAC_p$ and $LHGRFAC_f$) are applied directly to the LHGR limits to protect against fuel melting and overstraining of the cladding during an AOO (Reference 2). In all conditions, the margin to the LHGR limits is determined by applying the lowest multiplier from the applicable $LHGRFAC_p$ and $LHGRFAC_f$ multipliers for the power/flow statepoint of interest to the steady state LHGR limit (Reference 2).

$LHGRFAC_p$ and $LHGRFAC_f$ multipliers were established to support base case and EOOS conditions for all Cycle 26 exposures and scram speeds. The $LHGRFAC_p$ multipliers for ATRIUM 10XM and OPTIMA2 are presented in Table 5-7 and Table 5-8, respectively. The $LHGRFAC_f$ multipliers for ATRIUM 10XM and OPTIMA2 are presented in Table 5-9 and Table 5-10, respectively. The $LHGRFAC_p$ and $LHGRFAC_f$ multipliers are applicable in both TLO and SLO.

The EOOS conditions separated by "/" in these tables represent single EOOS conditions and not any combination of conditions.

Table 5-1: LHGR Limits for OPTIMA2 Lattices 101 and 108
(Reference 3)

Peak Pellet Exposure (GWd/MTU)	LHGR Limit (kW/ft)
0.000	13.72
14.000	13.11
23.000	12.22
57.000	8.87
62.000	8.38
75.000	3.43

Table 5-2: LHGR Limits for OPTIMA2 Lattices 181, 185, 186, 187, and 189
(Reference 3)

Peak Pellet Exposure (GWd/MTU)	LHGR Limit (kW/ft)
0.000	13.72
14.000	13.11
23.000	12.22
57.000	8.87
62.000	8.38
75.000	3.43

Table 5-3: LHGR Limits for OPTIMA2 Lattices 171, 172, 173, 174, 178, 179, 180, 183, and 188
(Reference 3)

Peak Pellet Exposure (GWd/MTU)	LHGR Limit (kW/ft)
0.000	13.72
14.000	13.11
19.500	12.56
19.501	12.44
23.000	12.09
34.000	11.01
34.001	11.13
57.000	8.87
62.000	8.38
75.000	3.43

Table 5-4: LHGR Limits for OPTIMA2 Lattices 176, 177, and 184
(Reference 3)

Peak Pellet Exposure (GWd/MTU)	LHGR Limit (kW/ft)
0.000	13.72
14.000	13.11
18.500	12.66
18.501	12.41
23.000	11.97
41.000	10.23
41.001	10.44
57.000	8.87
62.000	8.38
75.000	3.43

Table 5-5: LHGR Limits for OPTIMA2 Lattices 175 and 182
(Reference 3)

Peak Pellet Exposure (GWd/MTU)	LHGR Limit (kW/ft)
0.000	13.72
13.999	13.11
14.000	12.71
23.000	11.85
36.000	10.60
36.001	10.93
57.000	8.87
62.000	8.38
75.000	3.43

Table 5-6: LHGR Limits for ATRIUM 10XM
(Reference 2)

Peak Pellet Exposure (GWd/MTU)	LHGR Limit (kW/ft)
0.0	14.1
18.9	14.1
74.4	7.4

Table 5-7: ATRIUM 10XM $LHGRFAC_p$ Multipliers for All Scram Insertion Times, All Exposures
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**50**	**80**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.51	0.51	0.55	0.67	0.69	0.93	1.00
	> 60	0.51	0.51	0.55				
TBVOOS	≤ 60	0.38	0.38	0.49	0.67	0.69	0.93	1.00
	> 60	0.36	0.36	0.49				
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.50	0.50	0.55	0.67	0.68	0.89	1.00
	> 60	0.50	0.50	0.55				
FHOOS								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**50**	**80**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.47	0.47	0.53	0.67	0.69	0.90	1.00
	> 60	0.47	0.47	0.53				
TBVOOS	≤ 60	0.35	0.35	0.45	0.67	0.69	0.90	1.00
	> 60	0.35	0.35	0.45				
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.47	0.47	0.53	0.67	0.68	0.89	1.00
	> 60	0.47	0.47	0.53				

Table 5-8: OPTIMA2 LHGRFAC$_p$ Multipliers for All Scram Insertion Times, All Exposures
(Reference 2)

<table>
<tr><th colspan="11">Nominal FWT</th></tr>
<tr><th rowspan="2">EOOS Condition</th><th rowspan="2">Core Flow (% rated)</th><th colspan="9">Core Power (% rated)</th></tr>
<tr><th>0</th><th>25</th><th>≤ 38.5</th><th>> 38.5</th><th>50</th><th>60</th><th>75</th><th>80</th><th>100</th></tr>
<tr><td rowspan="2">Base/TCV Stuck Closed/MSIVOOS</td><td>≤ 60</td><td>0.60</td><td>0.60</td><td>0.63</td><td rowspan="2">0.70</td><td rowspan="2">0.74</td><td rowspan="2">0.80</td><td rowspan="2"></td><td rowspan="2">0.88</td><td rowspan="2">1.00</td></tr>
<tr><td>> 60</td><td>0.53</td><td>0.53</td><td>0.60</td></tr>
<tr><td rowspan="2">TBVOOS</td><td>≤ 60</td><td>0.43</td><td>0.43</td><td>0.53</td><td rowspan="2">0.69</td><td rowspan="2">0.72</td><td rowspan="2">0.74</td><td rowspan="2"></td><td rowspan="2">0.78</td><td rowspan="2">0.99</td></tr>
<tr><td>> 60</td><td>0.41</td><td>0.41</td><td>0.50</td></tr>
<tr><td rowspan="2">TCV Slow Closure/ PLUOOS/PCOOS</td><td>≤ 60</td><td>0.60</td><td>0.60</td><td>0.60</td><td rowspan="2">0.60</td><td rowspan="2">0.66</td><td rowspan="2"></td><td rowspan="2">0.69</td><td rowspan="2">0.87</td><td rowspan="2">0.99</td></tr>
<tr><td>> 60</td><td>0.53</td><td>0.53</td><td>0.60</td></tr>
<tr><th colspan="11">FHOOS</th></tr>
<tr><th rowspan="2">EOOS Condition</th><th rowspan="2">Core Flow (% rated)</th><th colspan="9">Core Power (% rated)</th></tr>
<tr><th>0</th><th>25</th><th>≤ 38.5</th><th>> 38.5</th><th>50</th><th>60</th><th>75</th><th>80</th><th>100</th></tr>
<tr><td rowspan="2">Base/TCV Stuck Closed/MSIVOOS</td><td>≤ 60</td><td>0.55</td><td>0.55</td><td>0.60</td><td rowspan="2">0.65</td><td rowspan="2">0.69</td><td rowspan="2">0.74</td><td rowspan="2"></td><td rowspan="2">0.83</td><td rowspan="2">0.99</td></tr>
<tr><td>> 60</td><td>0.53</td><td>0.53</td><td>0.60</td></tr>
<tr><td rowspan="2">TBVOOS</td><td>≤ 60</td><td>0.42</td><td>0.42</td><td>0.51</td><td rowspan="2">0.65</td><td rowspan="2">0.69</td><td rowspan="2">0.73</td><td rowspan="2"></td><td rowspan="2">0.78</td><td rowspan="2">0.96</td></tr>
<tr><td>> 60</td><td>0.41</td><td>0.41</td><td>0.49</td></tr>
<tr><td rowspan="2">TCV Slow Closure/ PLUOOS/PCOOS</td><td>≤ 60</td><td>0.55</td><td>0.55</td><td>0.60</td><td rowspan="2">0.60</td><td rowspan="2">0.66</td><td rowspan="2"></td><td rowspan="2">0.69</td><td rowspan="2">0.83</td><td rowspan="2">0.99</td></tr>
<tr><td>> 60</td><td>0.53</td><td>0.53</td><td>0.60</td></tr>
</table>

Table 5-9: ATRIUM 10XM $LHGRFAC_f$ Multipliers for All Cycle 26 Exposures, All EOOS
(Reference 2)

Core Flow (% rated)	$LHGRFAC_f$
0.0	0.57
35.0	0.57
80.0	1.00
108.0	1.00

Table 5-10: OPTIMA2 $LHGRFAC_f$ Multipliers for All Cycle 26 Exposures, All EOOS
(Reference 2)

Core Flow (% rated)	$LHGRFAC_f$
0.0	0.27
20.0	0.43
40.0	0.60
80.0	1.00
100.0	1.00
108.0	1.00

6. Control Rod Block Setpoints

Technical Specification Sections 3.3.2.1 and 3.4.1

The Rod Block Monitor Upscale Instrumentation Setpoints are determined from the relationships shown in Table 6-1.

Table 6-1: RBM Allowable Values
(Reference 6)

ROD BLOCK MONITOR UPSCALE TRIP FUNCTION	ALLOWABLE VALUE
Two Recirculation Loop Operation	$0.65\ W_d + 56.1\%$
Single Recirculation Loop Operation	$0.65\ W_d + 51.4\%$

W_d – percent of recirculation loop drive flow required to produce a rated core flow of 98.0 Mlb/hr.

The setpoint may be lower/higher and will still comply with the CRWE analysis because CRWE is analyzed unblocked (Reference 2).

7. Stability Protection Setpoints

Technical Specifications Section 3.3.1.3

The OPRM PBDA Trip Settings are provided in Table 7-1.

Table 7-1: OPRM PBDA Trip Settings
(Reference 2)

PBDA Trip Amplitude Setpoint (Sp)	Corresponding Maximum Confirmation Count Setpoint (Np)
1.14*	16

* A higher setpoint is allowed per Reference 2, but the PBDA Trip Amplitude Setpoint is being kept at 1.14 per site request. This is acceptable per Reference 2.

The PBDA is the only OPRM setting credited in the safety analysis as documented in the licensing basis for the OPRM system (Methodology 3).

The OPRM PBDA trip settings are based, in part, on the cycle specific OLMCPR and the power/flow-dependent MCPR limits. Any change to the OLMCPR values and/or the power/flow-dependent MCPR limits should be evaluated for potential impact on the OPRM PBDA trip settings.

The OPRM PBDA trip settings are applicable when the OPRM system is declared operable, and the associated Technical Specifications are implemented.

8. Modes of Operation

The allowed modes of operation with combinations of equipment out-of-service are as described in Table 8-1. The EOOS conditions separated by "/" in these tables represent single EOOS conditions and not combinations of conditions.

Note that the following EOOS options have operational restrictions: all SLO, all EOOS options with 1 TCV/TSV stuck closed, and MSIVOOS. See Table 8-2 for specific restrictions.

Table 8-1: Modes of Operation
(Reference 2)

EOOS Option	Thermal Limit Set
Base Case	BASE CASE ➤ TLO or SLO ➤ Nominal FWT or FHOOS
TBVOOS due to Main Generator Load Reject Trip Relays OOS	PLUOOS/TCV SLOW C ➤ TLO for Nominal FWT*
TBVOOS	TBVOOS ➤ TLO or SLO ➤ Nominal FWT or FHOOS
1 TCV/TSV Stuck Closed	BASE CASE ➤ TLO or SLO ➤ Nominal FWT or FHOOS
One MSIVOOS	MSIVOOS ➤ TLO or SLO ➤ Nominal FWT or FHOOS
TCV Slow Closure	PLUOOS/TCV SLOW C ➤ TLO or SLO ➤ Nominal FWT or FHOOS
PLUOOS	PLUOOS/TCV SLOW C ➤ TLO or SLO ➤ Nominal FWT or FHOOS
PCOOS	PLUOOS/TCV SLOW C ➤ TLO or SLO ➤ Nominal FWT or FHOOS
PLUOOS and 1 TCV/TSV Stuck Closed	PLUOOS/TCV SLOW C ➤ TLO for Nominal FWT or FHOOS ➤ SLO for Nominal FWT**
PCOOS and PLUOOS	PLUOOS/TCV SLOW C ➤ TLO for Nominal FWT or FHOOS ➤ SLO for Nominal FWT**
PCOOS and 1 TCV/TSV Stuck Closed	PLUOOS/TCV SLOW C ➤ TLO for Nominal FWT or FHOOS ➤ SLO for Nominal FWT**

* SLO and FHOOS <u>cannot</u> be applied for the case of TBVOOS due to main generator load reject trip relays OOS.
** FHOOS <u>cannot</u> be applied to SLO for the cases of PLUOOS and 1 TCV/TSV Stuck Closed, for the case of PCOOS and PLUOOS, or for the case of PCOOS and 1 TCV/TSV Stuck Closed.

Table 8-2: Core Operational Restrictions for EOOS Conditions
(Reference 2)

EOOS Condition	Core Flow (% of Rated)	Core Thermal Power (% of Rated Power)	Rod Line (%)
1 TCV Stuck Closed*	N/A	< 75	< 80
One MSIVOOS	N/A	< 75	N/A
SLO	< 51	< 50	N/A

* Also applicable to one TSV stuck closed.

All requirements for all applicable conditions listed in Table 8-2 MUST be met.

Common Notes:

1. All modes are allowed for operation at MELLLA, ICF (up to 108% rated core flow), and coastdown subject to the power restrictions in Table 8-2 (Reference 2). The licensing analysis supports full power operation to EOCLB (37,903 MWd/MTU CAVEX). Note that this value includes coastdown, where full power operation is not expected. Each OOS Option may be combined with each of the following conditions (Reference 2):
    a. Up to 40% of the TIP channels OOS
    b. Up to 50% of the LPRMs OOS
    c. An LPRM calibration frequency of up to 2500 EFPH

2. Nominal FWT results are valid for application within a +10°F/-30ºF temperature band around the nominal FWT curve (Reference 2). For operation outside of nominal FWT, a FWT reduction of up to 120°F is supported for all FHOOS conditions listed in Table 8-1 for cycle operation through EOCLB (Reference 2). At lower power levels, the feedwater temperature reduction is less (Reference 2). Per Reference 10, there is a restriction which requires that for a FWT reduction greater than 100°F, operation needs to be restricted to less than the 100% load line. For a feedwater temperature reduction of between 30ºF and 120°F, the FHOOS limits should be applied.

3. The base case and EOOS limits and multipliers support operation with 8 of the 9 turbine bypass valves operational (i.e., one bypass valve out of service) with the exception of the TBVOOS condition in which all bypass valves are inoperable (Reference 2). Use of the response curve in TRM Appendix H supports operation with any single TBV OOS. TRM Appendix H facilitates analysis with one valve OOS in that the capacity at 0.45 seconds from start of TSV closure is equivalent to the total capacity with eight out of the nine valves in service (Reference 9). The analyses also support Turbine Bypass flow of 29.6% of vessel rated steam flow (Reference 9), equivalent to one TBV OOS (or partially closed TBVs equivalent to one closed TBV), if the assumed opening profile for the remaining TBVs is met. If the opening profile is NOT met, or if the TBV system CANNOT pass an equivalent of 29.6% of vessel rated steam flow, utilize the TBVOOS condition.

4. For the TBVOOS condition, analyses assume zero TBVs trip open and zero TBVs are available for pressure control during the slow portion of the transient analysis (Reference 9). Steam relief capacity is defined in Reference 9.

5. Failure of the main generator load reject trip relays to actuate (e.g., main generator load reject trip relays OOS) will render the turbine bypass valve system inoperable during load reject events (Reference 2). Operation with the main generator load reject trip relays out of service in TLO is supported by the TCV slow closure limits (Reference 2), meaning that, in accordance with Table 8-1, the "PLUOOS/TCV SLOW C" thermal limit set should be applied. This is applicable between 25% and 50% of rated thermal power.

9. Methodology

The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. GE Topical Report NEDE-24011-P-A, Revision 14, "General Electric Standard Application for Reactor Fuel (GESTAR)," June 2000.

2. Removed.

3. GE Topical Report NEDO-32465-A, Revision 0, "Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications," August 1996.

4. Westinghouse Topical Report CENPD-300-P-A, Revision 0, "Reference Safety Report for Boiling Water Reactor Reload Fuel," July 1996.

5. Westinghouse Report WCAP-16081-P-A, Revision 0, "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2," March 2005.

6. Westinghouse Report WCAP-15682-P-A, Revision 0, "Westinghouse BWR ECCS Evaluation Model: Supplement 2 to Code Description, Qualification and Application," April 2003.

7. Westinghouse Report WCAP-16078-P-A, Revision 0, "Westinghouse BWR ECCS Evaluation Model: Supplement 3 to Code Description, Qualification and Application to SVEA-96 Optima2 Fuel," November 2004.

8. Westinghouse Topical Report WCAP-15836-P-A, Revision 0, "Fuel Rod Design Methods for Boiling Water Reactors – Supplement 1," April 2006.

9. Westinghouse Topical Report WCAP-15942-P-A, Revision 0, "Fuel Assembly Mechanical Design Methodology for Boiling Water Reactors Supplement 1 to CENP-287," March 2006.

10. Westinghouse Topical Report CENPD-390-P-A, Revision 0, "The Advanced PHOENIX and POLCA Codes for Nuclear Design of Boiling Water Reactors," December 2000.

11. Westinghouse Report WCAP-16865-P-A, Revision 1, "Westinghouse BWR ECCS Evaluation Model Updates: Supplement 4 to Code Description, Qualification and Application," October 2011.

12. Exxon Nuclear Company Report XN-NF-81-58(P)(A), Revision 2 and Supplements 1 and 2, "RODEX2 Fuel Rod Thermal-Mechanical Response Evaluation Model," March 1984.

13. Advanced Nuclear Fuels Corporation Report ANF-89-98(P)(A), Revision 1 and Supplement 1, "Generic Mechanical Design Criteria for BWR Fuel Designs," May 1995.

14. Siemens Power Corporation Report EMF-85-74(P), Revision 0 Supplement 1 (P)(A) and Supplement 2 (P)(A), "RODEX2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model," February 1998.

15. AREVA NP Topical Report BAW-10247PA, Revision 0, "Realistic Thermal-Mechanical Fuel Rod Methodology for Boiling Water Reactors," February 2008.

16. Exxon Nuclear Company Topical Report XN-NF-80-19(P)(A), Volume 1 Revision 0 and Supplements 1 and 2, "Exxon Nuclear Methodology for Boiling Water Reactors – Neutronic Methods for Design and Analysis," March 1983.

17. Exxon Nuclear Company Topical Report XN-NF-80-19(P)(A), Volume 4 Revision 1, “Exxon Nuclear Methodology for Boiling Water Reactors: Application of the ENC Methodology for BWR Reloads,” June 1986.

18. Exxon Nuclear Company Topical Report XN-NF-80-19(P)(A), Volume 3 Revision 2, “Exxon Nuclear Methodology for Boiling Water Reactors, THERMEX: Thermal Limits Methodology Summary Description,” January 1987.

19. Siemens Power Corporation Topical Report EMF-2158(P)(A), Revision 0, “Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2,” October 1999.

20. Siemens Power Corporation Report EMF-2245(P)(A), Revision 0, “Application of Siemens Power Corporation’s Critical Power Correlations to Co-Resident Fuel,” August 2000.

21. AREVA NP Report EMF-2209(P)(A), Revision 3, “SPCB Critical Power Correlation,” September 2009.

22. AREVA Topical Report ANP-10298P-A, Revision 1, “ACE/ATRIUM 10XM Critical Power Correlation,” March 2014.

23. AREVA NP Topical Report ANP-10307PA, Revision 0, “AREVA MCPR Safety Limit Methodology for Boiling Water Reactors,” June 2011.

24. Exxon Nuclear Company Report XN-NF-84-105(P)(A), Volume 1 Revision 0 and Volume 1 Supplements 1 and 2, “XCOBRA-T: A Computer Code for BWR Transient Thermal-Hydraulic Core Analysis,” February 1987.

25. Advanced Nuclear Fuels Corporation Report ANF-913(P)(A), Volume 1 Revision 1 and Volume 1 Supplements 2, 3, and 4, “COTRANSA2: A Computer Program for Boiling Water Reactor Transient Analyses,” August 1990.

26. Framatome ANP Report EMF-2361(P)(A), Revision 0, “EXEM BWR-2000 ECCS Evaluation Model,” May 2001.

27. Siemens Power Corporation Report EMF-2292 (P)(A), Revision 0, “ATRIUM™-10: Appendix K Spray Heat Transfer Coefficients,” September 2000.

28. Framatome ANP Topical Report ANF-1358(P)(A), Revision 3, “The Loss of Feedwater Heating Transient in Boiling Water Reactors,” September 2005.

29. Siemens Power Corporation Topical Report EMF-CC-074(P)(A), Volume 4 Revision 0, “BWR Stability Analysis: Assessment of STAIF with Input from MICROBURN-B2,” August 2000.

10. References

1. Exelon Generation Company, LLC and MidAmerican Energy Company, Docket No. 50-254, Quad Cities Nuclear Power Station, Unit 1, Renewed Facility Operating License, License No. DPR-29.

2. Framatome Report ANP-3744P Revision 0, "Quad Cities Unit 1 Cycle 26 Reload Safety Analysis," January 2019.

3. Westinghouse Report NF-BEX-15-2 Revision 0, "Quad Cities Nuclear Power Station Unit 1 Cycle 24 Reload Licensing Report", January 2015.

4. Framatome Report ANP-3718P Revision 0, "Quad Cities Unit 1 Cycle 26 ATRIUM 10XM Fuel Nuclear Fuel Design Report," August 2018.

5. Westinghouse Report NF-BEX-14-135-NP Revision 1, "Quad Cities Nuclear Power Station Unit 1 Cycle 24 Supplemental MAPLHGR Report," October 2015.

6. GE Document, GE DRF C51-00217-01, "Instrument Setpoint Calculation Nuclear Instrumentation, Rod Block Monitor, Commonwealth Edison Company, Quad Cities 1 & 2," December 14, 1999. (Attachment A to Exelon Design Analysis, QDC-0700-I-1419, Revision 0).

7. Westinghouse Report NF-BEX-14-98 Revision 0, "Bundle Design Report for Quad Cities 1 Cycle 24," August 2014.

8. Exelon Technical Specifications for Quad Cities 1 and 2, Table 3.1.4-1, "Control Rod Scram Times."

9. Exelon TODI ES1800018 Revision 0, "Quad Cities Unit 1 Cycle 26 Plant Parameters Document," June 29, 2018.

10. Exelon Letter, NF-MW:02-0081, "Approval of GE Evaluation of Dresden and Quad Cities Extended Final Feedwater Temperature Reduction," Carlos de la Hoz to Doug Wise and Alex Misak, August 27, 2002.

APPENDIX F

QUAD CITIES UNIT 2

CORE OPERATING LIMITS REPORT

Core Operating Limits Report

For

Quad Cities Unit 2 Cycle 25

Prepared By: ______________________________ Date: __________
Ann Hopkins – Nuclear Fuels

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Review By: ______________________________ Date: __________
Corie Glenn – Nuclear Fuels

Approved By: ______________________________ Date: __________
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SQR By: ______________________________ Date: __________
Kevin Egan – Station Qualified Reviewer

Table of Contents

Record of Quad Cities 2 Cycle 25 COLR Revisions

Revision	Description
12	Initial issuance for Q2C25

List of Tables

1. Terms and Definitions

AOO	Anticipated operational occurrence
APLHGR	Average planar linear heat generation rate
ASD	Adjustable Speed Drive
CAVEX	Core average exposure
CPR	Critical power ratio
CRWE	Control rod withdrawal error
EFPD	Effective full power day
EFPH	Effective full power hour
EOC	End of cycle
EOCLB	End of cycle licensing basis
EOFPL	End of full power life
EOFPLB	End of full power licensing basis
EOOS	Equipment out of service
FHOOS	Feedwater heater out of service
FWT	Feedwater temperature
ICF	Increased core flow
ISS	Intermediate scram speed
LHGR	Linear heat generation rate
$LHGRFAC_f$	Flow dependent LHGR multiplier
$LHGRFAC_p$	Power dependent LHGR multiplier
LPRM	Local power range monitor
MAPLHGR	Maximum average planar linear heat generation rate
MCPR	Minimum critical power ratio
$MCPR_f$	Flow dependent MCPR
$MCPR_p$	Power dependent MCPR
MELLLA	Maximum extended load line limit analysis
MSIVOOS	Main steam isolation valve out of service
MWd/MTU	MegaWatt days per metric ton Uranium
NEOC	Near end of cycle
NRC	Nuclear Regulatory Commission
NSS	Nominal scram speed
OLMCPR	Operating limit minimum critical power ratio
OOS	Out of service
OPRM	Oscillation power range monitor
PBDA	Period based detection algorithm
PCOOS	Pressure controller out of service
PLUOOS	Power load unbalance out of service
SLMCPR	Safety limit minimum critical power ratio
SLO	Single loop operation
TBV	Turbine bypass valve
TBVOOS	Turbine bypass valves out of service
TCV	Turbine control valve
TIP	Traversing incore probe
TLO	Two loop operation
TMOL	Thermal mechanical operating limit
TRM	Technical Requirements Manual
TSSS	Technical Specification scram speed
TSV	Turbine stop valve

2. General Information

This report is prepared in accordance with Technical Specification 5.6.5. The Q2C25 reload is licensed by Framatome. Framatome is the same company as AREVA, and many legal documents still contain the name AREVA. However, some legacy analyses by Westinghouse are still applicable for OPTIMA2 fuel as described in Reference 2.

Licensed rated thermal power is 2957 MWth. Rated core flow is 98 Mlb/hr. Operation up to 108% rated core flow is licensed for this cycle. For allowed operating regions, see applicable power/flow map.

The licensing analysis supports full power operation to EOCLB (38,325 MWd/MTU CAVEX). Note that this value includes coastdown, where full power operation is not expected. The transient analysis limits are provided for operation up to specific CAVEX exposures as defined in Section 4.3.

Coastdown is defined as operation beyond EOFPL with the plant power gradually reducing as available core reactivity diminishes. The Q2C25 reload analyses do not credit this reduced power during coastdown and the EOCLB limits remain valid for operation up to rated power.

Power and flow dependent limits are listed for various power and flow levels. Linear interpolation on power and flow (as applicable) is to be used to find intermediate values. Linear interpolation is also to be used for table items intentionally left blank, as indicated by boxes which are grayed out.

$MCPR_p$ for both fuel types and $LHGRFAC_p$ for OPTIMA2 vary with scram speed. All other thermal limits are analyzed to remain valid with NSS, ISS, and TSSS.

$LHGRFAC_f$ is independent of feedwater temperature and EOOS conditions.

For thermal limit monitoring above 100% rated core flow, the 100% core flow values can be used unless otherwise indicated in the applicable table.

For thermal limit monitoring above 100% rated power or 108% rated core flow, the 100% rated power or the 108% core flow thermal limit values, respectively, shall be used. Steady state operation is not allowed in this region. Limits are provided for transient conditions only.

3. Average Planar Linear Heat Generation Rate

<u>Technical Specifications Sections 3.2.1 and 3.4.1</u>

Table 3-1 provides the MAPLHGR SLO multipliers for ATRIUM 10XM and OPTIMA2 fuel. For OPTIMA2 natural uranium lattices, TLO and SLO MAPLHGR values are provided in Table 3-2. The limits provided in Table 3-2 were selected to be the more limiting of the limits provided in References 5 and 7. For all other OPTIMA2 lattices, lattice-specific MAPLHGR values for TLO are provided in Tables 3-3 through 3-41.

For ATRIUM 10XM fuel, the MAPLHGR values can be found in Tables 3-42 through 3-44.

During SLO, the limits in Tables 3-3 through 3-44 are multiplied by the fuel-specific SLO multiplier listed in Table 3-1. The ATRIUM 10XM multiplier may be applied to OPTIMA2 for SLO conditions, as the ATRIUM 10XM multiplier is more limiting.

Table 3-1: MAPLHGR SLO Multipliers
(References 2, 5, and 7)

Fuel Type	Multiplier
ATRIUM 10XM	0.80
OPTIMA2	0.86

Table 3-2: MAPLHGR for OPTIMA2 Lattices 91 and 98
(References 5, 6, 7, and 8)

All OPTIMA2 Bundles Lattices 91: Opt2-B0.71 98: Opt2-T0.71	
Average Planar Exposure (MWd/MTU)	**TLO and SLO MAPLHGR (kW/ft)**
0	7.50
75000	7.50

Table 3-3: MAPLHGR for OPTIMA2 Lattice 152
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 152: Opt2-B4.26-14G7.50-4G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	8.89
2500	9.17
5000	9.26
7500	9.39
10000	9.72
12000	9.88
15000	9.93
17000	9.92
20000	9.95
22000	9.97
24000	9.98
30000	9.72
36000	9.59
42000	9.48
50000	9.40
60000	9.54
72000	9.81
75000	9.81

Table 3-4: MAPLHGR for OPTIMA2 Lattice 153
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 153: Opt2-B4.40-14G7.50-4G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	8.84
2500	9.13
5000	9.17
7500	9.25
10000	9.39
12000	9.46
15000	9.56
17000	9.62
20000	9.73
22000	9.69
24000	9.65
30000	9.60
36000	9.54
42000	9.51
50000	9.51
60000	9.60
72000	9.85
75000	9.85

Table 3-5: MAPLHGR for OPTIMA2 Lattice 154
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 154: Opt2-BE4.49-14G7.50-4G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.05
2500	9.40
5000	9.38
7500	9.34
10000	9.50
12000	9.57
15000	9.68
17000	9.74
20000	9.84
22000	9.80
24000	9.76
30000	9.69
36000	9.66
42000	9.58
50000	9.56
60000	9.60
72000	9.89
75000	9.89

Table 3-6: MAPLHGR for OPTIMA2 Lattice 155
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 155: Opt2-M4.49-14G7.50-4G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.02
2500	9.37
5000	9.41
7500	9.35
10000	9.52
12000	9.59
15000	9.69
17000	9.76
20000	9.84
22000	9.80
24000	9.75
30000	9.69
36000	9.65
42000	9.58
50000	9.51
60000	9.58
72000	9.90
75000	9.90

Table 3-7: MAPLHGR for OPTIMA2 Lattice 156
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 156: Opt2-ME4.45-14G7.50-4G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.16
2500	9.52
5000	9.52
7500	9.51
10000	9.68
12000	9.76
15000	9.88
17000	10.00
20000	9.98
22000	9.98
24000	9.93
30000	9.88
36000	9.83
42000	9.72
50000	9.64
60000	9.63
72000	10.16
75000	10.16

Table 3-8: MAPLHGR for OPTIMA2 Lattice 157
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 157: Opt2-T4.45-18G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.28
2500	9.63
5000	9.46
7500	9.53
10000	9.66
12000	9.87
15000	10.18
17000	10.05
20000	9.99
22000	9.97
24000	9.93
30000	9.88
36000	9.79
42000	9.76
50000	9.65
60000	9.71
72000	10.20
75000	10.20

Table 3-9: MAPLHGR for OPTIMA2 Lattice 158
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 158: Opt2-T4.47-14G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.96
2500	10.26
5000	10.10
7500	10.01
10000	9.92
12000	10.01
15000	10.06
17000	10.03
20000	10.02
22000	10.01
24000	9.97
30000	9.93
36000	9.87
42000	9.76
50000	9.65
60000	9.70
72000	10.22
75000	10.22

Table 3-10: MAPLHGR for OPTIMA2 Lattice 159
(References 7 and 8)

Bundle **Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23)** **Lattice** **159: Opt2-B4.30-14G7.50-2G5.50**	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.42
2500	9.63
5000	9.70
7500	9.79
10000	9.87
12000	9.83
15000	9.88
17000	9.99
20000	10.11
22000	10.11
24000	10.13
30000	9.74
36000	9.61
42000	9.50
50000	9.41
60000	9.54
72000	9.81
75000	9.81

Table 3-11: MAPLHGR for OPTIMA2 Lattice 160
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 160: Opt2-B4.43-14G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.37
2500	9.62
5000	9.63
7500	9.69
10000	9.82
12000	9.73
15000	9.61
17000	9.59
20000	9.70
22000	9.72
24000	9.75
30000	9.70
36000	9.66
42000	9.61
50000	9.52
60000	9.62
72000	9.84
75000	9.84

Table 3-12: MAPLHGR for OPTIMA2 Lattice 161
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 161: Opt2-BE4.51-14G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.53
2500	9.76
5000	9.77
7500	9.73
10000	9.90
12000	9.77
15000	9.68
17000	9.69
20000	9.79
22000	9.84
24000	9.85
30000	9.81
36000	9.74
42000	9.65
50000	9.55
60000	9.62
72000	9.90
75000	9.90

Table 3-13: MAPLHGR for OPTIMA2 Lattice 162
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 162: Opt2-M4.51-14G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.47
2500	9.74
5000	9.77
7500	9.69
10000	9.89
12000	9.77
15000	9.68
17000	9.69
20000	9.80
22000	9.85
24000	9.85
30000	9.80
36000	9.73
42000	9.62
50000	9.51
60000	9.59
72000	9.90
75000	9.90

Table 3-14: MAPLHGR for OPTIMA2 Lattice 163
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 163: Opt2-ME4.47-14G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.66
2500	9.95
5000	9.94
7500	9.89
10000	10.06
12000	10.00
15000	9.89
17000	9.90
20000	10.05
22000	10.06
24000	10.08
30000	10.02
36000	9.93
42000	9.76
50000	9.59
60000	9.63
72000	10.16
75000	10.16

Table 3-15: MAPLHGR for OPTIMA2 Lattice 164
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 164: Opt2-T4.47-16G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.77
2500	10.09
5000	10.03
7500	10.00
10000	10.19
12000	10.13
15000	10.16
17000	10.15
20000	10.13
22000	10.14
24000	10.09
30000	10.04
36000	9.98
42000	9.82
50000	9.65
60000	9.71
72000	10.20
75000	10.20

Table 3-16: MAPLHGR for OPTIMA2 Lattice 165
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 165: Opt2-T4.49-14G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.46
2500	9.77
5000	9.58
7500	9.60
10000	9.65
12000	9.71
15000	9.98
17000	10.13
20000	10.12
22000	10.13
24000	10.09
30000	10.04
36000	9.99
42000	9.78
50000	9.67
60000	9.70
72000	10.21
75000	10.21

Table 3-17: MAPLHGR for OPTIMA2 Lattice 166
(References 7 and 8)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UM23) Lattice 166: Opt2-B4.59-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.30
2500	9.48
5000	9.38
7500	9.34
10000	9.35
12000	9.37
15000	9.41
17000	9.45
20000	9.52
22000	9.58
24000	9.60
30000	9.63
36000	9.63
42000	9.62
50000	9.63
60000	9.67
72000	9.90
75000	9.90

Table 3-18: MAPLHGR for OPTIMA2 Lattice 167
(References 7 and 8)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UM23) Lattice 167: Opt2-BE4.67-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.35
2500	9.57
5000	9.42
7500	9.45
10000	9.56
12000	9.45
15000	9.51
17000	9.56
20000	9.63
22000	9.69
24000	9.71
30000	9.74
36000	9.78
42000	9.70
50000	9.68
60000	9.64
72000	9.94
75000	9.94

Table 3-19: MAPLHGR for OPTIMA2 Lattice 168
(References 7 and 8)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UM23) Lattice 168: Opt2-M4.67-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.34
2500	9.58
5000	9.40
7500	9.50
10000	9.58
12000	9.47
15000	9.51
17000	9.57
20000	9.70
22000	9.69
24000	9.72
30000	9.77
36000	9.79
42000	9.69
50000	9.65
60000	9.62
72000	9.95
75000	9.95

Table 3-20: MAPLHGR for OPTIMA2 Lattice 169
(References 7 and 8)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UM23) Lattice 169: Opt2-ME4.65-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.56
2500	9.79
5000	9.63
7500	9.66
10000	9.68
12000	9.65
15000	9.73
17000	9.82
20000	9.93
22000	9.98
24000	9.98
30000	10.00
36000	10.00
42000	9.94
50000	9.80
60000	9.77
72000	10.21
75000	10.21

Table 3-21: MAPLHGR for OPTIMA2 Lattice 170
(References 7 and 8)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UM23) Lattice 170: Opt2-T4.64-10G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	10.00
2500	10.18
5000	9.96
7500	10.04
10000	9.83
12000	9.81
15000	9.82
17000	9.85
20000	9.93
22000	9.98
24000	9.97
30000	10.00
36000	10.00
42000	9.94
50000	9.82
60000	9.77
72000	10.24
75000	10.24

Table 3-22: MAPLHGR for OPTIMA2 Lattice 171
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24) Lattice 171: Opt2-B4.30-16G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.15
2500	9.49
5000	9.44
7500	9.58
10000	9.81
12000	9.96
15000	10.19
17000	10.33
20000	10.54
22000	10.55
24000	10.56
30000	10.27
36000	10.14
42000	10.02
50000	9.92
75000	9.92

Table 3-23: MAPLHGR for OPTIMA2 Lattice 172
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24) Lattice 172: Opt2-B4.43-16G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.08
2500	9.43
5000	9.35
7500	9.31
10000	9.44
12000	9.53
15000	9.69
17000	9.77
20000	9.93
22000	10.06
24000	10.18
30000	10.15
36000	10.11
42000	10.06
50000	10.04
75000	10.04

Table 3-24: MAPLHGR for OPTIMA2 Lattice 173
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24) Lattice 173: Opt2-BE4.52-16G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.11
2500	9.43
5000	9.36
7500	9.34
10000	9.51
12000	9.61
15000	9.78
17000	9.87
20000	10.03
22000	10.19
24000	10.30
30000	10.24
36000	10.20
42000	10.13
50000	10.07
75000	10.07

Table 3-25: MAPLHGR for OPTIMA2 Lattice 174
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24) Lattice 174: Opt2-M4.52-16G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.09
2500	9.43
5000	9.34
7500	9.34
10000	9.52
12000	9.63
15000	9.79
17000	9.88
20000	10.05
22000	10.21
24000	10.29
30000	10.23
36000	10.19
42000	10.12
50000	10.03
75000	10.03

Table 3-26: MAPLHGR for OPTIMA2 Lattice 175
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24) Lattice 175: Opt2-ME4.48-16G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.22
2500	9.57
5000	9.47
7500	9.49
10000	9.66
12000	9.78
15000	9.95
17000	10.07
20000	10.39
22000	10.53
24000	10.48
30000	10.43
36000	10.37
42000	10.26
50000	10.13
75000	10.13

Table 3-27: MAPLHGR for OPTIMA2 Lattice 176
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24) Lattice 176: Opt2-T4.48-16G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.27
2500	9.60
5000	9.49
7500	9.47
10000	9.61
12000	9.76
15000	9.92
17000	10.06
20000	10.42
22000	10.50
24000	10.46
30000	10.42
36000	10.36
42000	10.22
50000	10.10
75000	10.10

Table 3-28: MAPLHGR for OPTIMA2 Lattice 177
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24) Lattice 177: Opt2-T4.48-18G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.35
2500	9.70
5000	9.61
7500	9.58
10000	9.75
12000	9.96
15000	10.29
17000	10.50
20000	10.53
22000	10.51
24000	10.47
30000	10.42
36000	10.34
42000	10.31
50000	10.18
75000	10.18

Table 3-29: MAPLHGR for OPTIMA2 Lattice 178
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50 (UO24) Lattice 178: Opt2-B4.30-16G7.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.44
2500	9.71
5000	9.58
7500	9.71
10000	9.88
12000	9.99
15000	10.21
17000	10.33
20000	10.48
22000	10.50
24000	10.52
30000	10.26
36000	10.12
42000	10.01
50000	9.92
75000	9.92

Table 3-30: MAPLHGR for OPTIMA2 Lattice 179
(References 5 and 6)

Bundle **Opt2-4.00-16GZ7.50/5.50 (UO24)** **Lattice** **179: Opt2-B4.43-16G7.50**	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.38
2500	9.62
5000	9.50
7500	9.44
10000	9.52
12000	9.57
15000	9.69
17000	9.77
20000	9.92
22000	10.05
24000	10.16
30000	10.13
36000	10.08
42000	10.04
50000	10.03
75000	10.03

Table 3-31: MAPLHGR for OPTIMA2 Lattice 180
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50 (UO24) Lattice 180: Opt2-BE4.53-16G7.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.42
2500	9.70
5000	9.56
7500	9.49
10000	9.60
12000	9.65
15000	9.79
17000	9.87
20000	10.02
22000	10.17
24000	10.28
30000	10.23
36000	10.19
42000	10.12
50000	10.06
75000	10.06

Table 3-32: MAPLHGR for OPTIMA2 Lattice 181
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50 (UO24) Lattice 181: Opt2-M4.53-16G7.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.40
2500	9.71
5000	9.59
7500	9.51
10000	9.62
12000	9.67
15000	9.80
17000	9.88
20000	10.04
22000	10.19
24000	10.28
30000	10.22
36000	10.19
42000	10.11
50000	10.03
75000	10.03

Table 3-33: MAPLHGR for OPTIMA2 Lattice 182
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50 (UO24) Lattice 182: Opt2-ME4.49-16G7.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.55
2500	9.86
5000	9.73
7500	9.66
10000	9.76
12000	9.82
15000	9.96
17000	10.06
20000	10.36
22000	10.51
24000	10.47
30000	10.42
36000	10.37
42000	10.25
50000	10.10
75000	10.10

Table 3-34: MAPLHGR for OPTIMA2 Lattice 183
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50 (UO24) Lattice 183: Opt2-T4.49-16G7.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.61
2500	9.89
5000	9.74
7500	9.65
10000	9.72
12000	9.81
15000	9.92
17000	10.05
20000	10.39
22000	10.47
24000	10.45
30000	10.42
36000	10.35
42000	10.21
50000	10.09
75000	10.09

Table 3-35: MAPLHGR for OPTIMA2 Lattice 184
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50 (UO24) Lattice 184: Opt2-T4.49-16G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.69
2500	10.00
5000	9.87
7500	9.76
10000	9.86
12000	10.01
15000	10.28
17000	10.48
20000	10.55
22000	10.54
24000	10.50
30000	10.45
36000	10.39
42000	10.31
50000	10.17
75000	10.17

Table 3-36: MAPLHGR for OPTIMA2 Lattice 185
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 185: Opt2-B4.59-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.71
2500	9.89
5000	9.80
7500	9.77
10000	9.77
12000	9.82
15000	9.87
17000	9.92
20000	10.00
22000	10.07
24000	10.09
30000	10.12
36000	10.12
42000	10.13
50000	10.12
75000	10.12

Table 3-37: MAPLHGR for OPTIMA2 Lattice 186
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 186: Opt2-BE4.67-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.75
2500	9.96
5000	9.82
7500	9.86
10000	9.99
12000	9.91
15000	9.96
17000	10.03
20000	10.11
22000	10.18
24000	10.20
30000	10.25
36000	10.27
42000	10.20
50000	10.15
75000	10.15

Table 3-38: MAPLHGR for OPTIMA2 Lattice 187
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 187: Opt2-M4.67-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.74
2500	9.97
5000	9.80
7500	9.89
10000	10.01
12000	9.92
15000	9.98
17000	10.04
20000	10.18
22000	10.18
24000	10.21
30000	10.26
36000	10.28
42000	10.20
50000	10.15
75000	10.15

Table 3-39: MAPLHGR for OPTIMA2 Lattice 188
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 188: Opt2-ME4.65-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.96
2500	10.19
5000	10.03
7500	10.06
10000	10.15
12000	10.10
15000	10.19
17000	10.29
20000	10.41
22000	10.47
24000	10.47
30000	10.50
36000	10.50
42000	10.44
50000	10.28
75000	10.28

Table 3-40: MAPLHGR for OPTIMA2 Lattice 189
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 189: Opt2-T4.65-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	10.02
2500	10.25
5000	10.09
7500	10.11
10000	10.09
12000	10.07
15000	10.18
17000	10.27
20000	10.43
22000	10.47
24000	10.48
30000	10.51
36000	10.49
42000	10.42
50000	10.24
75000	10.24

Table 3-41: MAPLHGR for OPTIMA2 Lattice 190
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 190: Opt2-T4.64-10G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	10.42
2500	10.60
5000	10.39
7500	10.48
10000	10.30
12000	10.27
15000	10.28
17000	10.32
20000	10.41
22000	10.46
24000	10.46
30000	10.48
36000	10.49
42000	10.43
50000	10.28
75000	10.28

Table 3-42: MAPLHGR for ATRIUM 10XM Bottom Lattices
(References 2 and 13)

Bundles XMLC-4102B-16GV80, XMLC-4102B-15GV80, XMLC-4183B-12GV80 Lattices XMLCP-0720L-0G0a, XMLCB-0720L-0G0a, XMLCB-4574L-14G80, XMLCB-4562L-16G80, XMLCB-4574L-14GV80, XMLCB-4568L-15GV80	
Average Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	11.70
15000	11.70
20000	11.70
67000	6.60

Table 3-43: MAPLHGR for ATRIUM 10XM Bottom Lattice XMLCB-4667L-12G80
(References 2 and 13)

Bundle XMLC-4183B-12GV80 Lattice XMLCB-4667L-12G80	
Average Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	11.70
15000	11.70
20000	11.44
67000	6.62

Table 3-44: MAPLHGR for ATRIUM 10XM Top Lattices
(References 2 and 13)

Bundles **XMLC-4102B-16GV80, XMLC-4102B-15GV80, XMLC-4183B-12GV80** **Lattices** **XMLCT-0720L-0G0da, XMLCT-0720L-0G0a, XMLCT-4650L-12G60, XMLCT-4637L-14G80, XMLCTP-4637L-14G80, XMLCT-4630L-15GV80, XMLCTP-4630L-15GV80, XMLCT-4720L-12G60, XMLCT-4722L-12G80, XMLCTP-4722L-12G80**	
Average Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	11.70
15000	11.60
20000	11.21
67000	6.60

4. Operating Limit Minimum Critical Power Ratio

Technical Specification Sections 3.2.2, 3.4.1, and 3.7.7

The OLMCPRs for Q2C25 were established so that less than 0.1% of the fuel rods in the core are expected to experience boiling transition during an AOO initiated from rated or off-rated conditions and are based on the Technical Specifications SLMCPR values (Reference 2).

Tables 4-3 through 4-27 include MCPR limits for various specified EOOS conditions. The EOOS conditions separated by “/” in these tables represent single EOOS conditions and not any combination of conditions. Refer to Section 8 for a detailed explanation of allowable combined EOOS conditions.

4.1. Manual Flow Control MCPR Limits

The OLMCPR is determined for a given power and flow condition by evaluating the power-dependent MCPR and the flow-dependent MCPR and selecting the greater of the two.

4.1.1. Power-Dependent MCPR

The OLMCPR as a function of core thermal power ($MCPR_p$) is shown in Tables 4-3 through 4-26. $MCPR_p$ limits are dependent on scram times as described in Section 4.2, exposure as described in Section 4.3, fuel type, FWT, and whether the plant is in TLO or SLO. TLO limits for ATRIUM 10XM fuel are given in Tables 4-3 through 4-11 and SLO limits for ATRIUM 10XM are given in Tables 4-21 through 4-23. TLO limits for OPTIMA2 fuel are given in Tables 4-12 through 4-20 and SLO limits for OPTIMA2 fuel are given in Tables 4-24 through 4-26.

4.1.2. Flow-Dependent MCPR

Table 4-27 gives the OLMCPR limit as a function of the flow ($MCPR_f$) based on the applicable plant condition. These values are applicable to both ATRIUM 10XM and OPTIMA2 fuel.

4.2. Scram Time

TSSS, ISS, and NSS refer to scram speeds. The scram time values associated with these speeds are shown in Table 4-1. The TSSS scram times shown in Table 4-1 are the same as those specified in the Technical Specifications (Reference 4).

To utilize the OLMCPR limits for NSS in Tables 4-3, 4-6, 4-9, 4-12, 4-15, 4-18, 4-21, and 4-24, the average control rod insertion time at each control rod insertion fraction must be equal to or less than the NSS time shown in Table 4-1 below.

To utilize the OLMCPR limits for ISS in Tables 4-4, 4-7, 4-10, 4-13, 4-16, 4-19, 4-22 and 4-25, the average control rod insertion time at each control rod insertion fraction must be equal to or less than the ISS time shown in Table 4-1 below.

The “Average Control Rod Insertion Time” is defined as the sum of the control rod insertion times of all operable control rods divided by the number of operable control rods. Conservative adjustments to the NSS and ISS scram speeds were made to the analysis inputs to appropriately account for the effects of 1 stuck control rod and one additional control rod that is assumed to fail to scram (Reference 2).

To utilize the OLMCPR limits for TSSS in Tables 4-5, 4-8, 4-11, 4-14, 4-17, 4-20, 4-23, and 4-26, the control rod insertion time of each operable control rod at each control rod insertion fraction must be less than or equal to the TSSS time shown in Table 4-1 below. The Technical Specifications allow operation with up to 12 “slow” and 1 stuck control rod. One additional control rod is assumed to fail to scram for the system transient analyses performed to establish $MCPR_p$ limits (Reference 2). Conservative adjustments to the TSSS scram speeds were made to the analysis inputs to appropriately account for the effects of the slow and stuck rods on scram reactivity (Reference 2).

For cases below 38.5% power (P_{bypass}), the results are relatively insensitive to scram speed, and only TSSS analyses were performed (Reference 2).

Table 4-1: Scram Times
(References 2 and 4)

Control Rod Insertion Fraction (%)	NSS (seconds)	ISS (seconds)	TSSS (seconds)
5	0.324	0.36	0.48
20	0.694	0.72	0.89
50	1.510	1.58	1.98
90	2.670	2.80	3.44

4.3. Exposure Dependent MCPR Limits

Exposure-dependent $MCPR_p$ limits were established to support operation from BOC to NEOC (CAVEX of 35,057 MWd/MTU), NEOC to EOFPLB (CAVEX of 37,507 MWd/MTU), and EOFPLB to EOCLB (CAVEX of 38,325 MWd/MTU) as defined by the CAVEX values listed in Table 4-2. Note that the thermal limits are based on CAVEX. The limits at a later exposure range can be used earlier in the cycle as they are the same or more conservative.

Table 4-2: Exposure Basis for Transient Analysis
(Reference 2)

Core Average Exposure (CAVEX) (MWd/MTU)	Description
35,057	Break point for exposure-dependent $MCPR_p$ limits (NEOC)
37,507	Design basis rod patterns to EOFPL + 25 EFPD (EOFPLB)
38,325	EOCLB – Maximum licensing core exposure, including coastdown

4.4. Recirculation Pump ASD Settings

Technical Requirement Manual 2.1.a.1

Quad Cities 2 Cycle 25 was analyzed with a slow flow excursion event assuming a failure of the recirculation flow control system such that the core flow increases slowly to the maximum flow physically permitted by the equipment, assumed to be 112% of rated core flow (Reference 2); therefore, the recirculation pump ASD must be set to maintain core flow less than 112% (109.76 Mlb/hr) for all runout events.

Table 4-3: ATRIUM 10XM TLO $MCPR_p$ Limits for NSS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.01		1.48
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.93	1.48
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.07		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.12		1.48
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.93	1.48
	> 60	2.73	2.73	2.33			

Table 4-4: ATRIUM 10XM TLO $MCPR_p$ Limits for ISS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.02		1.48
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.94	1.48
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.08		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.13		1.48
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.94	1.48
	> 60	2.73	2.73	2.33			

Table 4-5: ATRIUM 10XM TLO MCPR$_p$ Limits for TSSS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.98		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.04		1.49
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.32	1.97	1.48
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.11		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.15		1.50
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.32	1.97	1.48
	> 60	2.73	2.73	2.33			

Table 4-6: ATRIUM 10XM TLO MCPR$_p$ Limits for NSS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)

(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.01		1.48
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.95	1.48
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.07		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.12		1.49
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.95	1.48
	> 60	2.73	2.73	2.33			

Table 4-7: ATRIUM 10XM TLO $MCPR_p$ Limits for ISS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.02		1.48
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.95	1.48
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.08		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.13		1.50
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.95	1.48
	> 60	2.73	2.73	2.33			

Table 4-8: ATRIUM 10XM TLO $MCPR_p$ Limits for TSSS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.98		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.04		1.51
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.32	1.99	1.49
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.11		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.15		1.52
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.32	1.99	1.49
	> 60	2.73	2.73	2.33			

Table 4-9: ATRIUM 10XM TLO $MCPR_p$ Limits for NSS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.01		1.48
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.95	1.48
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.07		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.12		1.49
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.95	1.48
	> 60	2.73	2.73	2.33			

Table 4-10: ATRIUM 10XM TLO $MCPR_p$ Limits for ISS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.02		1.48
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.95	1.48
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.08		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.13		1.50
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.95	1.48
	> 60	2.73	2.73	2.33			

Table 4-11: ATRIUM 10XM TLO $MCPR_p$ Limits for TSSS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.98		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.04		1.51
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.32	1.99	1.49
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.11		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.15		1.52
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.32	1.99	1.49
	> 60	2.73	2.73	2.33			

Table 4-12: OPTIMA2 TLO $MCPR_p$ Limits for NSS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT

EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.96		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.03		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.33	1.96	1.53
	> 60	2.71	2.71	2.35			

FHOOS

EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.12		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.14		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.33	1.96	1.53
	> 60	2.71	2.71	2.35			

Table 4-13: OPTIMA2 TLO $MCPR_p$ Limits for ISS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)

(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.96		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.04		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.34	1.97	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.12		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.15		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.34	1.97	1.53
	> 60	2.71	2.71	2.35			

Table 4-14: OPTIMA2 TLO MCPR$_p$ Limits for TSSS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.97		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.07		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.35	2.00	1.53
	> 60	2.71	2.71	2.35			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.14		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.18		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.35	2.00	1.53
	> 60	2.71	2.71	2.35			

Table 4-15: OPTIMA2 TLO $MCPR_p$ Limits for NSS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.96		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.03		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.33	1.97	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.12		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.14		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.33	1.97	1.53
	> 60	2.71	2.71	2.35			

Table 4-16: OPTIMA2 TLO $MCPR_p$ Limits for ISS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.96		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.04		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.34	1.98	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.12		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.15		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.34	1.98	1.53
	> 60	2.71	2.71	2.35			

Table 4-17: OPTIMA2 TLO $MCPR_p$ Limits for TSSS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.97		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.07		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.35	2.02	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.14		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.18		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.35	2.02	1.53
	> 60	2.71	2.71	2.35			

Table 4-18: OPTIMA2 TLO $MCPR_p$ Limits for NSS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.96		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.03		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.33	1.97	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.12		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.14		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.33	1.97	1.53
	> 60	2.71	2.71	2.35			

Table 4-19: OPTIMA2 TLO $MCPR_p$ Limits for ISS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)
(Reference 2)

<table>
<tr><th colspan="8">Nominal FWT</th></tr>
<tr><th rowspan="2">EOOS Condition</th><th rowspan="2">Core Flow (% rated)</th><th colspan="6">Core Power (% rated)</th></tr>
<tr><th>0</th><th>25</th><th>≤ 38.5</th><th>> 38.5</th><th>70</th><th>100</th></tr>
<tr><td rowspan="2">Base/TCV Stuck Closed/MSIVOOS</td><td>≤ 60</td><td>2.41</td><td>2.41</td><td>2.10</td><td rowspan="2">1.96</td><td rowspan="2"></td><td rowspan="2">1.53</td></tr>
<tr><td>> 60</td><td>2.71</td><td>2.71</td><td>2.35</td></tr>
<tr><td rowspan="2">TBVOOS</td><td>≤ 60</td><td>3.24</td><td>3.24</td><td>2.49</td><td rowspan="2">2.04</td><td rowspan="2"></td><td rowspan="2">1.54</td></tr>
<tr><td>> 60</td><td>3.47</td><td>3.47</td><td>2.77</td></tr>
<tr><td rowspan="2">TCV Slow Closure/ PLUOOS/PCOOS</td><td>≤ 60</td><td>2.41</td><td>2.41</td><td>2.35</td><td rowspan="2">2.34</td><td rowspan="2">1.98</td><td rowspan="2">1.53</td></tr>
<tr><td>> 60</td><td>2.71</td><td>2.71</td><td>2.35</td></tr>
<tr><th colspan="8">FHOOS</th></tr>
<tr><th rowspan="2">EOOS Condition</th><th rowspan="2">Core Flow (% rated)</th><th colspan="6">Core Power (% rated)</th></tr>
<tr><th>0</th><th>25</th><th>≤ 38.5</th><th>> 38.5</th><th>70</th><th>100</th></tr>
<tr><td rowspan="2">Base/TCV Stuck Closed/MSIVOOS</td><td>≤ 60</td><td>2.57</td><td>2.57</td><td>2.24</td><td rowspan="2">2.12</td><td rowspan="2"></td><td rowspan="2">1.53</td></tr>
<tr><td>> 60</td><td>2.71</td><td>2.71</td><td>2.35</td></tr>
<tr><td rowspan="2">TBVOOS</td><td>≤ 60</td><td>3.36</td><td>3.36</td><td>2.57</td><td rowspan="2">2.15</td><td rowspan="2"></td><td rowspan="2">1.54</td></tr>
<tr><td>> 60</td><td>3.60</td><td>3.60</td><td>2.86</td></tr>
<tr><td rowspan="2">TCV Slow Closure/ PLUOOS/PCOOS</td><td>≤ 60</td><td>2.57</td><td>2.57</td><td>2.35</td><td rowspan="2">2.34</td><td rowspan="2">1.98</td><td rowspan="2">1.53</td></tr>
<tr><td>> 60</td><td>2.71</td><td>2.71</td><td>2.35</td></tr>
</table>

Table 4-20: OPTIMA2 TLO $MCPR_p$ Limits for TSSS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)

(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.97		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.07		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.35	2.02	1.53
	> 60	2.71	2.71	2.35			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.14		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.18		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.35	2.02	1.53
	> 60	2.71	2.71	2.35			

Table 4-21: ATRIUM 10XM SLO $MCPR_p$ Limits for NSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.54	2.54	2.22	2.09	2.06
TBVOOS	3.46	3.46	2.65	2.09	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.54	2.54	2.34	2.32	2.20
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.71	2.71	2.35	2.09	2.06
TBVOOS	3.59	3.59	2.75	2.14	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.71	2.71	2.35	2.32	2.20

Table 4-22: ATRIUM 10XM SLO $MCPR_p$ Limits for ISS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.54	2.54	2.22	2.09	2.06
TBVOOS	3.46	3.46	2.65	2.09	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.54	2.54	2.34	2.32	2.20
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.71	2.71	2.35	2.10	2.06
TBVOOS	3.59	3.59	2.75	2.15	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.71	2.71	2.35	2.32	2.20

Table 4-23: ATRIUM 10XM SLO $MCPR_p$ Limits for TSSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.54	2.54	2.22	2.09	2.06
TBVOOS	3.46	3.46	2.65	2.09	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.54	2.54	2.34	2.34	2.22
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.71	2.71	2.35	2.13	2.06
TBVOOS	3.59	3.59	2.75	2.17	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.71	2.71	2.35	2.34	2.22

Table 4-24: OPTIMA2 SLO $MCPR_p$ Limits for NSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.43	2.43	2.17	2.17	2.14
TBVOOS	3.26	3.26	2.51	2.17	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.43	2.43	2.37	2.35	2.22

FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.59	2.59	2.26	2.17	2.14
TBVOOS	3.38	3.38	2.59	2.17	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.59	2.59	2.37	2.35	2.22

Table 4-25: OPTIMA2 SLO $MCPR_p$ Limits for ISS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.43	2.43	2.17	2.17	2.14
TBVOOS	3.26	3.26	2.51	2.17	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.43	2.43	2.37	2.36	2.23
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.59	2.59	2.26	2.17	2.14
TBVOOS	3.38	3.38	2.59	2.17	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.59	2.59	2.37	2.36	2.23

Table 4-26: OPTIMA2 SLO $MCPR_p$ Limits for TSSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.43	2.43	2.17	2.17	2.14
TBVOOS	3.26	3.26	2.51	2.17	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.43	2.43	2.37	2.37	2.25
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.59	2.59	2.26	2.17	2.14
TBVOOS	3.38	3.38	2.59	2.20	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.59	2.59	2.37	2.37	2.25

Table 4-27: ATRIUM 10XM and OPTIMA2 $MCPR_f$ Limits, All Insertion Times, All Exposures
(Reference 2)

EOOS Condition*	Core Flow (% rated)	$MCPR_f$ Limit
Base Case / FHOOS / PCOOS / PLUOOS / TCV Slow Closure / PLUOOS + PCOOS in TLO and SLO	0	1.70
	35	1.70
	108	1.18
Any Scenario** with One MSIVOOS	0	1.81
	35	1.81
	108	1.18
Any Scenario** with TBVOOS	0	1.90
	35	1.90
	108	1.35
Any Scenario** with 1 Stuck Closed TCV/TSV	0	1.70
	35	1.70
	108	1.18

* See Section 8 for further operating restrictions.
** “Any Scenario” implies any other combination of allowable EOOS conditions that is not otherwise covered by this table.

Note that the $MCPR_f$ limits for any scenario with 1 stuck closed TCV/TSV are identical to base case $MCPR_f$ limits. This is reflected in the thermal limit sets presented in Table 8-1.

5. Linear Heat Generation Rate

Technical Specification Sections 3.2.3, 3.4.1, and 3.7.7

The TMOL at rated conditions for the OPTIMA2 and ATRIUM 10XM fuel is established in terms of the maximum LHGR as a function of peak pellet (rod nodal) exposure. The LHGR limits for OPTIMA2 fuel are presented in Tables 5-1 through 5-5. The limits in Table 5-1 apply to OPTIMA2 lattices that do not require Gadolinia set down penalties as well as any natural blanket segments in OPTIMA2 fuel (lattice types 91 and 98). The limits in Tables 5-2 through 5-5 apply to OPTIMA2 lattices that do require Gadolinia set down penalties. The LHGR limits for ATRIUM 10XM fuel are presented in Table 5-6.

The power- and flow-dependent LHGR multipliers ($LHGRFAC_p$ and $LHGRFAC_f$) are applied directly to the LHGR limits to protect against fuel melting and overstraining of the cladding during an AOO (Reference 2). In all conditions, the margin to the LHGR limits is determined by applying the lowest multiplier from the applicable $LHGRFAC_p$ and $LHGRFAC_f$ multipliers for the power/flow statepoint of interest to the steady state LHGR limit (Reference 2).

$LHGRFAC_p$ and $LHGRFAC_f$ multipliers were established to support base case and all EOOS conditions for all Cycle 25 exposures and scram speeds. $LHGRFAC_p$ is scram speed-dependent for OPTIMA2 fuel. The $LHGRFAC_p$ multipliers for ATRIUM 10XM are presented in Table 5-7. The $LHGRFAC_p$ multipliers for OPTIMA2 are presented in Tables 5-8 and 5-9, with Table 5-8 containing multipliers for NSS and ISS and Table 5-9 containing multipliers for TSSS. NSS, ISS, and TSSS are defined in Section 4.2. The $LHGRFAC_f$ multipliers for ATRIUM 10XM and OPTIMA2 are presented in Table 5-10 and Table 5-11, respectively.

Table 5-1: LHGR Limits for OPTIMA2 Lattices 91, 98, 152, 153, 154, 155, 159, 160, 161, 162, 163, 164, 166, 167, 168, 169, 170, 171, 172, 173, 174, 178, 179, 180, 181, 185, 186, 187, 188, 189, and 190
(References 3 and 10)

Rod Nodal Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	13.72
14,000	13.11
23,000	12.22
57,000	8.87
62,000	8.38
75,000	3.43

Table 5-2: LHGR Limits for OPTIMA2 Lattices 156, 157, and 158
(Reference 10)

Rod Nodal Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	13.72
14,000	13.11
19,999	12.51
20,000	12.38
35,000	10.92
35,001	11.04
62,000	8.38
75,000	3.43

Table 5-3: LHGR Limits for OPTIMA2 Lattice 165
(Reference 10)

Rod Nodal Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	13.72
14,000	13.11
32,999	11.24
33,000	11.11
37,000	10.73
37,001	10.84
62,000	8.38
75,000	3.43

Table 5-4: LHGR Limits for OPTIMA2 Lattices 176, 177, 183 and 184
(Reference 3)

Rod Nodal Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	13.72
14,000	13.11
20,000	12.52
20,001	12.39
23,000	12.10
37,000	10.73
37,001	10.84
57,000	8.87
62,000	8.38
75,000	3.43

Table 5-5: LHGR Limits for OPTIMA2 Lattices 175 and 182
(Reference 3)

Rod Nodal Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	13.72
14,000	13.11
14,001	12.84
23,000	11.98
34,000	10.92
34,001	11.14
57,000	8.87
62,000	8.38
75,000	3.43

Table 5-6: LHGR Limits for ATRIUM 10XM
(Reference 2)

Peak Pellet Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	14.1
18,900	14.1
74,400	7.4

Table 5-7: ATRIUM 10XM $LHGRFAC_p$ Multipliers, All Insertion Times, All Exposures
(Reference 2)

Nominal FWT									
EOOS Condition	Core Flow (% rated)	Core Power (%rated)							
		0	25	≤ 38.5	> 38.5	50	80	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.51	0.51	0.59	0.67	0.70	0.93	1.00
	> 60	0.51	0.51	0.59				
TBVOOS	≤ 60	0.39	0.39	0.55	0.67	0.70	0.93	1.00
	> 60	0.38	0.38	0.51				
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.51	0.51	0.59	0.67	0.70	0.93	1.00
	> 60	0.51	0.51	0.59				

FHOOS								
EOOS Condition	Core Flow (% rated)	Core Power (%rated)						
		0	25	≤ 38.5	> 38.5	50	80	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.49	0.49	0.57	0.67	0.70	0.93	1.00
	> 60	0.47	0.47	0.55				
TBVOOS	≤ 60	0.38	0.38	0.51	0.67	0.70	0.93	1.00
	> 60	0.36	0.36	0.48				
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.49	0.49	0.57	0.67	0.70	0.93	1.00
	> 60	0.47	0.47	0.55				

Table 5-8: OPTIMA2 $LHGRFAC_p$ Multipliers, NSS and ISS Insertion Times, All Exposures
(Reference 2)

<table>
<tr><th colspan="11">Nominal FWT</th></tr>
<tr><th rowspan="2">EOOS Condition</th><th rowspan="2">Core Flow (% rated)</th><th colspan="9">Core Power (%rated)</th></tr>
<tr><th>0</th><th>25</th><th>≤ 38.5</th><th>> 38.5</th><th>50</th><th>60</th><th>70</th><th>80</th><th>100</th></tr>
<tr><td rowspan="2">Base/TCV Stuck Closed/MSIVOOS</td><td>≤ 60</td><td>0.58</td><td>0.58</td><td>0.63</td><td rowspan="2">0.69</td><td rowspan="2">0.76</td><td rowspan="2">0.83</td><td rowspan="2"></td><td rowspan="2">0.88</td><td rowspan="2">0.99</td></tr>
<tr><td>> 60</td><td>0.54</td><td>0.54</td><td>0.63</td></tr>
<tr><td rowspan="2">TBVOOS</td><td>≤ 60</td><td>0.42</td><td>0.42</td><td>0.54</td><td rowspan="2">0.68</td><td rowspan="2">0.72</td><td rowspan="2">0.73</td><td rowspan="2"></td><td rowspan="2">0.76</td><td rowspan="2">0.96</td></tr>
<tr><td>> 60</td><td>0.42</td><td>0.42</td><td>0.50</td></tr>
<tr><td rowspan="2">TCV Slow Closure/ PLUOOS/PCOOS</td><td>≤ 60</td><td>0.58</td><td>0.58</td><td>0.63</td><td rowspan="2">0.63</td><td rowspan="2">0.68</td><td rowspan="2"></td><td rowspan="2">0.72</td><td rowspan="2">0.85</td><td rowspan="2">0.98</td></tr>
<tr><td>> 60</td><td>0.54</td><td>0.54</td><td>0.63</td></tr>
<tr><th colspan="11">FHOOS</th></tr>
<tr><th rowspan="2">EOOS Condition</th><th rowspan="2">Core Flow (% rated)</th><th colspan="9">Core Power (%rated)</th></tr>
<tr><th>0</th><th>25</th><th>≤ 38.5</th><th>> 38.5</th><th>50</th><th>60</th><th>70</th><th>80</th><th>100</th></tr>
<tr><td rowspan="2">Base/TCV Stuck Closed/MSIVOOS</td><td>≤ 60</td><td>0.53</td><td>0.53</td><td>0.60</td><td rowspan="2">0.63</td><td rowspan="2">0.70</td><td rowspan="2">0.76</td><td rowspan="2"></td><td rowspan="2">0.87</td><td rowspan="2">0.97</td></tr>
<tr><td>> 60</td><td>0.53</td><td>0.53</td><td>0.60</td></tr>
<tr><td rowspan="2">TBVOOS</td><td>≤ 60</td><td>0.40</td><td>0.40</td><td>0.52</td><td rowspan="2">0.63</td><td rowspan="2">0.69</td><td rowspan="2">0.73</td><td rowspan="2"></td><td rowspan="2">0.76</td><td rowspan="2">0.94</td></tr>
<tr><td>> 60</td><td>0.40</td><td>0.40</td><td>0.49</td></tr>
<tr><td rowspan="2">TCV Slow Closure/ PLUOOS/PCOOS</td><td>≤ 60</td><td>0.53</td><td>0.53</td><td>0.60</td><td rowspan="2">0.63</td><td rowspan="2">0.68</td><td rowspan="2"></td><td rowspan="2">0.72</td><td rowspan="2">0.85</td><td rowspan="2">0.97</td></tr>
<tr><td>> 60</td><td>0.53</td><td>0.53</td><td>0.60</td></tr>
</table>

Table 5-9: OPTIMA2 $LHGRFAC_p$ Multipliers, TSSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT

EOOS Condition	Core Flow (% rated)	Core Power (%rated) 0	25	≤ 38.5	> 38.5	50	60	70	80	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.58	0.58	0.63	0.69	0.76	0.83		0.88	0.97
	> 60	0.54	0.54	0.63						
TBVOOS	≤ 60	0.42	0.42	0.54	0.68	0.72	0.73		0.76	0.94
	> 60	0.42	0.42	0.50						
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.58	0.58	0.63	0.63	0.68		0.72	0.85	0.97
	> 60	0.54	0.54	0.63						

FHOOS

EOOS Condition	Core Flow (% rated)	Core Power (%rated) 0	25	≤ 38.5	> 38.5	50	60	70	80	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.53	0.53	0.60	0.63	0.70	0.76		0.87	0.96
	> 60	0.53	0.53	0.60						
TBVOOS	≤ 60	0.40	0.40	0.52	0.63	0.69	0.73		0.76	0.93
	> 60	0.40	0.40	0.49						
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.53	0.53	0.60	0.63	0.68		0.72	0.85	0.96
	> 60	0.53	0.53	0.60						

Table 5-10: ATRIUM 10XM $LHGRFAC_f$ Multipliers, All Insertion Times, All Exposures, All EOOS
(Reference 2)

Core Flow (% rated)	$LHGRFAC_f$
0.0	0.57
35.0	0.57
80.0	1.00
108.0	1.00

Table 5-11: OPTIMA2 $LHGRFAC_f$ Multipliers, All Insertion Times, All Exposures, All EOOS
(Reference 2)

Core Flow (% rated)	$LHGRFAC_f$
0.0	0.27
20.0	0.43
40.0	0.60
80.0	1.00
100.0	1.00
108.0	1.00

6. Control Rod Block Setpoints

Technical Specification Sections 3.3.2.1 and 3.4.1

The Rod Block Monitor Upscale Instrumentation Setpoints are determined from the relationships shown in Table 6-1.

Table 6-1: Rod Block Monitor Upscale Instrumentation Setpoints
(Reference 11)

ROD BLOCK MONITOR UPSCALE TRIP FUNCTION	ALLOWABLE VALUE
Two Recirculation Loop Operation	$0.65\ W_d + 56.1\%$
Single Recirculation Loop Operation	$0.65\ W_d + 51.4\%$

W_d – percent of recirculation loop drive flow required to produce a rated core flow of 98.0 Mlb/hr.

The setpoint may be lower/higher and will still comply with the CRWE analysis because CRWE is analyzed unblocked (Reference 2).

7. Stability Protection Setpoints

Technical Specifications Section 3.3.1.3

The OPRM PBDA Trip Settings are provided in Table 7-1.

Table 7-1: OPRM PBDA Trip Settings
(Reference 2)

PBDA Trip Amplitude Setpoint (Sp)	Corresponding Maximum Confirmation Count Setpoint (Np)
1.14	16

The PBDA is the only OPRM setting credited in the safety analysis as documented in the licensing basis for the OPRM system (Methodology 3).

The OPRM PBDA trip settings are based, in part, on the cycle specific OLMCPR and the power/flow dependent MCPR limits. Any change to the OLMCPR values and/or the power/flow dependent MCPR limits should be evaluated for potential impact on the OPRM PBDA trip settings.

The OPRM PBDA trip settings are applicable when the OPRM system is declared operable and the associated Technical Specifications are implemented.

8. Modes of Operation

The allowed modes of operation with combinations of EOOS are as described in Table 8-1. The EOOS conditions separated by "/" in these tables represent single EOOS conditions and not combinations of conditions.

Note that the following EOOS options have operational restrictions: all SLO, all EOOS options with 1 TCV/TSV stuck closed, and MSIVOOS. See Table 8-2 for specific restrictions.

Table 8-1: Modes of Operation
(Reference 2)

EOOS Option	Thermal Limit Set
Base Case	BASE CASE ➢ TLO or SLO ➢ Nominal FWT or FHOOS
TBVOOS due to Main Generator Load Reject Trip Relays OOS	PLUOOS/TCV SLOW C ➢ TLO for Nominal FWT*
TBVOOS	TBVOOS ➢ TLO or SLO ➢ Nominal FWT or FHOOS
1 TCV/TSV Stuck Closed	BASE CASE ➢ TLO or SLO ➢ Nominal FWT or FHOOS
One MSIVOOS	MSIVOOS ➢ TLO or SLO ➢ Nominal FWT or FHOOS
TCV Slow Closure	PLUOOS/TCV SLOW C ➢ TLO or SLO ➢ Nominal FWT or FHOOS
PLUOOS	PLUOOS/TCV SLOW C ➢ TLO or SLO ➢ Nominal FWT or FHOOS
PCOOS	PLUOOS/TCV SLOW C ➢ TLO or SLO ➢ Nominal FWT or FHOOS
PLUOOS and 1 TCV/TSV Stuck Closed	PLUOOS/TCV SLOW C ➢ TLO for Nominal FWT or FHOOS ➢ SLO for Nominal FWT**
PCOOS and PLUOOS	PLUOOS/TCV SLOW C ➢ TLO for Nominal FWT or FHOOS ➢ SLO for Nominal FWT**
PCOOS and 1 TCV/TSV Stuck Closed	PLUOOS/TCV SLOW C ➢ TLO for Nominal FWT or FHOOS ➢ SLO for Nominal FWT**

* SLO and FHOOS <u>cannot</u> be applied for the case of TBVOOS due to main generator load reject trip relays OOS.
** FHOOS <u>cannot</u> be applied to SLO for the cases of PLUOOS and 1 TCV/TSV Stuck Closed, for the case of PCOOS and PLUOOS, or for the case of PCOOS and 1 TCV/TSV Stuck Closed.

Common Notes:

1. All modes are allowed for operation at MELLLA, ICF (up to 108% rated core flow), and coastdown subject to the power restrictions in Table 8-2 (Reference 2). The licensing analysis supports full power operation to EOCLB (38,325 MWd/MTU CAVEX). Note that this value includes coastdown, where full power operation is not expected. Each OOS Option may be combined with each of the following conditions (Reference 2):
    a. Up to 40% of the TIP channels OOS
    b. Up to 50% of the LPRMs OOS
    c. An LPRM calibration frequency of up to 2500 EFPH

2. Nominal FWT results are valid for application within a +10°F/-30°F temperature band around the nominal FWT curve (Reference 2). For operation outside of nominal FWT, a FWT reduction of between 30ºF and 120ºF is supported for all FHOOS conditions listed in Table 8-1 for cycle operation through EOCLB (Reference 2). At lower power levels, the feedwater temperature reduction is less (Reference 2). Per Reference 12, there is a restriction which requires that for a FWT reduction greater than 100ºF, operation needs to be restricted to less than the 100% rod line. For a feedwater temperature reduction of between 30ºF and 120ºF, the FHOOS limits should be applied.

3. The base case and EOOS limits and multipliers support operation with 8 of 9 turbine bypass valves operational (i.e., one bypass valve out of service) with the exception of the TBVOOS condition in which all bypass valves are inoperable (Reference 2). Use of the response curve in TRM Appendix H supports operation with any single TBV OOS. TRM Appendix H facilitates analysis with one valve OOS in that the capacity at 0.45 seconds from start of TSV closure is equivalent to the total capacity with eight out of the nine valves in service (Reference 9). The analyses also support Turbine Bypass flow of 29.6% of vessel rated steam flow (Reference 9), equivalent to one TBV OOS (or partially closed TBVs equivalent to one closed TBV), if the assumed opening profile for the remaining TBVs is met. If the opening profile is NOT met, or if the TBV system CANNOT pass an equivalent of 29.6% of vessel rated steam flow, utilize the TBVOOS condition.

4. For the TBVOOS condition, analyses assume zero TBVs trip open and zero TBVs are available for pressure control during the slow portion of the transient analysis (Reference 9). Steam relief capacity is defined in Reference 9.

5. Failure of the main generator load reject trip relays to actuate (e.g., main generator load reject trip relays OOS) will render the turbine bypass valve system inoperable during load reject events (Reference 14). Operation with the main generator load reject trip relays out of service in TLO is supported by the TCV slow closure limits (Reference 2), meaning that, in accordance with Table 8-1, the PLUOOS/TCV SLOW C thermal limit set should be applied. This is applicable between 25% and 50% of rated thermal power.

Table 8-2: Core Operational Restrictions for EOOS Conditions
(Reference 2)

EOOS Condition	Core Flow (% of Rated)	Core Thermal Power (% of Rated Power)	Rod Line (%)
1 TCV/TSV Stuck Closed PCOOS and 1 TCV/TSV Stuck Closed PLUOOS and 1 TCV/TSV Stuck Closed	N/A	< 75	< 80
One MSIVOOS	N/A	< 75	N/A
SLO	< 51	< 50	N/A

All requirements for all applicable conditions listed in Table 8-2 MUST be met.

9. Methodology

The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. GE Topical Report NEDE-24011-P-A, Revision 14, “General Electric Standard Application for Reactor Fuel (GESTAR),” June 2000.

2. Removed.

3. GE Topical Report NEDO-32465-A, Revision 0, “Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications,” August 1996.

4. Westinghouse Topical Report CENPD-300-P-A, Revision 0, “Reference Safety Report for Boiling Water Reactor Reload Fuel,” July 1996.

5. Westinghouse Report WCAP-16081-P-A, Revision 0, “10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2,” March 2005.

6. Westinghouse Report WCAP-15682-P-A, Revision 0, “Westinghouse BWR ECCS Evaluation Model: Supplement 2 to Code Description, Qualification and Application,” April 2003.

7. Westinghouse Report WCAP-16078-P-A, Revision 0, “Westinghouse BWR ECCS Evaluation Model: Supplement 3 to Code Description, Qualification and Application to SVEA-96 Optima2 Fuel,” November 2004.

8. Westinghouse Topical Report WCAP-15836-P-A, Revision 0, “Fuel Rod Design Methods for Boiling Water Reactors – Supplement 1,” April 2006.

9. Westinghouse Topical Report WCAP-15942-P-A, Revision 0, “Fuel Assembly Mechanical Design Methodology for Boiling Water Reactors Supplement 1 to CENP-287,” March 2006.

10. Westinghouse Topical Report CENPD-390-P-A, Revision 0, “The Advanced PHOENIX and POLCA Codes for Nuclear Design of Boiling Water Reactors,” December 2000.

11. Westinghouse Report WCAP-16865-P-A, Revision 1, "Westinghouse BWR ECCS Evaluation Model Updates: Supplement 4 to Code Description, Qualification and Application," October 2011.

12. Exxon Nuclear Company Report XN-NF-81-58(P)(A), Revision 2 and Supplements 1 and 2, “RODEX2 Fuel Rod Thermal-Mechanical Response Evaluation Model,” March 1984.

13. Advanced Nuclear Fuels Corporation Report ANF-89-98(P)(A), Revision 1 and Supplement 1, “Generic Mechanical Design Criteria for BWR Fuel Designs,” May 1995.

14. Siemens Power Corporation Report EMF-85-74(P), Revision 0 Supplement 1 (P)(A) and Supplement 2 (P)(A), “RODEX2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model,” February 1998.

15. AREVA NP Topical Report BAW-10247PA, Revision 0, “Realistic Thermal-Mechanical Fuel Rod Methodology for Boiling Water Reactors,” February 2008.

16. Exxon Nuclear Company Topical Report XN-NF-80-19(P)(A), Volume 1 Revision 0 and Supplements 1 and 2, “Exxon Nuclear Methodology for Boiling Water Reactors – Neutronic Methods for Design and Analysis,” March 1983.

17. Exxon Nuclear Company Topical Report XN-NF-80-19(P)(A), Volume 4 Revision 1, “Exxon Nuclear Methodology for Boiling Water Reactors: Application of the ENC Methodology for BWR Reloads,” June 1986.

18. Exxon Nuclear Company Topical Report XN-NF-80-19(P)(A), Volume 3 Revision 2, “Exxon Nuclear Methodology for Boiling Water Reactors, THERMEX: Thermal Limits Methodology Summary Description,” January 1987.

19. Siemens Power Corporation Topical Report EMF-2158(P)(A), Revision 0, “Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2,” October 1999.

20. Siemens Power Corporation Report EMF-2245(P)(A), Revision 0, “Application of Siemens Power Corporation’s Critical Power Correlations to Co-Resident Fuel,” August 2000.

21. AREVA NP Report EMF-2209(P)(A), Revision 3, “SPCB Critical Power Correlation,” September 2009.

22. AREVA Topical Report ANP-10298P-A, Revision 1, “ACE/ATRIUM 10XM Critical Power Correlation,” March 2014.

23. AREVA NP Topical Report ANP-10307PA, Revision 0, “AREVA MCPR Safety Limit Methodology for Boiling Water Reactors,” June 2011.

24. Exxon Nuclear Company Report XN-NF-84-105(P)(A), Volume 1 Revision 0 and Volume 1 Supplements 1 and 2, “XCOBRA-T: A Computer Code for BWR Transient Thermal-Hydraulic Core Analysis,” February 1987.

25. Advanced Nuclear Fuels Corporation Report ANF-913(P)(A), Volume 1 Revision 1 and Volume 1 Supplements 2, 3, and 4, “COTRANSA2: A Computer Program for Boiling Water Reactor Transient Analyses,” August 1990.

26. Framatome ANP Report EMF-2361(P)(A), Revision 0, “EXEM BWR-2000 ECCS Evaluation Model,” May 2001.

27. Siemens Power Corporation Report EMF-2292 (P)(A), Revision 0, “ATRIUM™-10: Appendix K Spray Heat Transfer Coefficients,” September 2000.

28. Framatome ANP Topical Report ANF-1358(P)(A), Revision 3, “The Loss of Feedwater Heating Transient in Boiling Water Reactors,” September 2005.

29. Siemens Power Corporation Topical Report EMF-CC-074(P)(A), Volume 4 Revision 0, “BWR Stability Analysis: Assessment of STAIF with Input from MICROBURN-B2,” August 2000.

10. References

1. Exelon Generation Company, LLC and MidAmerican Energy Company, Docket No. 50-265, Quad Cities Nuclear Power Station, Unit 2 Renewed Facility Operating License No. DPR-30.

2. Framatome Report, ANP-3642P, Revision 1, "Quad Cities Unit 2 Cycle 25 Reload Safety Analysis," February 2018.

3. Westinghouse Document, NF-BEX-16-2, Revision 0, "Quad Cities Nuclear Power Station Unit 2 Cycle 24 Reload Licensing Report," January 2016.

4. Technical Specifications for Quad Cities 1 and 2, Table 3.1.4-1, "Control Rod Scram Times".

5. Westinghouse Document, NF-BEX-15-174-NP, Revision 0, "Quad Cities Nuclear Power Station Unit 2 Cycle 24 MAPLHGR Report," January 2016.

6. Westinghouse Letter, NF-BEX-15-109, Revision 0, "Bundle Design Report for Quad Cities Unit 2 Cycle 24," August 4, 2015.

7. Westinghouse Document, NF-BEX-13-168-NP, Revision 0, "Quad Cities Nuclear Power Station Unit 2 Cycle 23 MAPLHGR Report," January 2014.

8. Westinghouse Letter, NF-BEX-13-122, Revision 0, "Bundle Design Report for Quad Cities 2 Cycle 23," September 9, 2013.

9. Exelon TODI, ES1700011, Revision 4, "Quad Cities Unit 2 Cycle 25 Plant Parameters Document," November 7, 2017.

10. Westinghouse Document, NF-BEX-14-4, Revision 0, "Quad Cities Nuclear Power Station Unit 2 Cycle 23 Reload Licensing Report," February 2014.

11. GE Document, GE DRF C51-00217-01, "Instrument Setpoint Calculation Nuclear Instrumentation, Rod Block Monitor, Commonwealth Edison Company, Quad Cities 1 & 2," December 14, 1999. (Attachment A to Exelon Design Analysis, QDC-0700-I-1419, Revision 0)

12. Exelon Letter, NF-MW:02-0081, "Approval of GE Evaluation of Dresden and Quad Cities Extended Final Feedwater Temperature Reduction," August 27, 2002.

13. AREVA Report, ANP-3612P, Revision 0, "Quad Cities Unit 2 Cycle 25 ATRIUM 10XM Fuel Nuclear Fuel Design Report," September 2017.

TECHNICAL REQUIREMENTS MANUAL
CONTROL PROGRAM

TABLE OF CONTENTS

1.1 PURPOSE

The purpose of this Program is to provide guidance for identifying, processing, and implementing changes to the Technical Requirements Manual (TRM). This Program implements and satisfies the requirements of TRM Section 1.6, "Technical Requirements Manual Revisions."

This Program is applicable to the preparation, review, implementation, and distribution of changes to the TRM. This Program also provides guidance for preparing TRM Change Packages for distribution.

1.2 REFERENCES

1. TRM Section 1.6, "Technical Requirements Manual Revisions"
2. 10 CFR 50.4, "Written Communications"
3. 10 CFR 50.59, "Changes, Tests and Experiments"
4. 10 CFR 50.71, "Maintenance of Records, Making of Reports"
5. 10 CFR 50.90, "Application for Amendment of License or Construction Permit"

1.3 DEFINITIONS AND/OR ACRONYMS

10 CFR 50.59 REVIEW - A written regulatory evaluation which provides the basis for the determination that a change does, or does not, require NRC approval pursuant to 10 CFR 50.59. The scope of the evaluation should be commensurate with the potential safety significance of the change, but must address the relevant safety concerns included in the Safety Analysis Report and other owner controlled documents. The depth of the evaluation must be sufficient to determine whether or not NRC approval is required prior to implementation. Depending upon the significance of the change, the evaluation may be brief; however, a simple statement of conclusion is not sufficient.

EDITORIAL CHANGE - Editorial changes include correction of punctuation, insignificant word or title changes, style or format changes, typographical errors, or correction of reference errors that do not change the intent, outcome, results, functions, processes, responsibilities, or performance requirements of the item being changed. Changes in numerical values shall not be considered as editorial changes. Editorial changes do not constitute a change to the TRM and therefore do not require further 10 CFR 50.59 Reviews. If the full scope of this proposed change is encompassed by one or more of the below, then the change is considered editorial.

- Rewording or format changes that do not result in changing actions to be accomplished.
- Deletion of cycle-specific information that is no longer applicable.
- Addition of clarifying information, such as:
  - Spelling, grammar, or punctuation changes
  - Changes to references
  - Name or title references

1.4 PROGRAM DESCRIPTION

1. A Licensee may make changes to the TRM without prior NRC approval provided the changes do not require NRC approval pursuant to 10 CFR 50.59.

2. Changes that require NRC approval pursuant to 10 CFR 50.59 shall be submitted to the NRC pursuant to 10 CFR 50.90 and reviewed and approved by the NRC prior to implementation.

3. The TRM is part of the Updated Final Safety Analysis Report (UFSAR) by reference and shall be maintained consistent with the remainder of the UFSAR.

4. If a change to the TRM is not consistent with the remainder of the UFSAR, then the cognizant Engineer shall prepare and submit a UFSAR Change Package when the TRM Change Request is submitted to Regulatory Assurance (RA) for processing.

5. Changes to the TRM that do not require prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e), as modified by approved exemptions.

6. Any change to a Station's TRM shall be transmitted, via Attachment D, "Technical Requirements Manual Change Applicability Review Form," to the Regulatory Assurance Managers (RAMs) at each of the other Stations. The RAM will review the TRM change for applicability at their respective Station and document their review on Attachment D.

7. TRM changes associated with a Technical Specifications (TS) Amendment shall be implemented consistent with the implementation requirements of the TS Amendment.

8. RA is responsible for the control and distribution of the TRM. In order to prevent distribution errors (i.e., omissions or duplications), RA shall maintain the master TRM distribution list.

1.5 PROGRAM IMPLEMENTATION

1. TRM Change Requestor identifies the need for a revision to the TRM and notifies the RA Licensing Engineer (i.e., hereafter referred to as RA LE). A TRM change can be initiated through any Stations' RA. TRM Change Requestor notifies their counterparts on the need for a change.

2. RA LE notifies their counterparts of identified need for revision to the TRM.

3. RA LE assigns a TRM Change Request Number (CR #) and records on Attachment B, "Technical Requirements Manual Change Request Log." The CR # should be a sequential number beginning with the last two digits of the year (e.g., 00-00#).

4. RA LE drafts TRM changes considering format, rules of usage, and technical adequacy, and notifies RAMs at each of the other Stations by transmitting Attachment D, "Technical Requirements Manual Change Applicability Review Form."

5. RA LE makes an electronic version of the proposed TRM changes available in a working directory for use in the preparation of the 10 CFR 50.59 REVIEW and Station Qualified Review (SQR) process. The RA LE shall ensure that the master electronic TRM files are revised per step 12 below upon receiving SQR approval. The Revision number in the footer should be a sequential number (i.e., 1, 2, etc.).

NOTE

If the TRM changes are applicable to more than one Station, the following steps should be performed concurrently for each Station.

6. TRM Change Requestor provides a 10 CFR 50.59 REVIEW for the TRM changes in accordance with appropriate plant procedures. An exception to this requirement applies when the changes are being requested in order to reflect an approved NRC Safety Evaluation (SE) associated with a site specific Operating License or TS change. The NRC SE is sufficient to support the changes provided it has been determined that the changes are consistent with and entirely bounded by the NRC SE. A 10 CFR 50.59 REVIEW shall be performed for TRM changes that reflect generic industry approval by an NRC SE to determine site specific applicability. A 10 CFR 50.59 REVIEW is not required for an EDITORIAL CHANGE.

7. TRM Change Requestor completes Attachment A, "Technical Requirements Manual Change Request Form," as follows:

   a. Identifies the affected sections, and includes a copy of the proposed TRM changes;

   b. Briefly summarizes the changes including the TLCO, Action, Surveillance Requirement, or Bases (if applicable) to which the changes apply;

   c. Briefly summarizes the reason for the changes and attaches all supporting documentation;

   d. Identifies any schedule requirements and proposed implementation date that apply (i.e., describe any time limitations that might apply which would require expedited processing). If the changes are outage related, then checks "yes" and lists the applicable outage identifier;

e. Identifies any known implementation requirements such as procedure changes, UFSAR changes, Passport changes, Reportability Manual revisions, pre-implementation training requirements, etc.;

f. If a 10 CFR 50.59 REVIEW was prepared to support the TRM changes, the Requestor then checks the appropriate box, lists the associated 10 CFR 50.59 REVIEW Number, and attaches the original;

g. If the changes to the TRM are the result of an approved NRC SE associated with a site specific Operating License or TS change and the scope of the changes determined to be consistent with and entirely bounded by the NRC SE, then the Requestor checks the appropriate box and attaches a copy;

h. If the changes to the TRM are EDITORIAL CHANGES, then the Requestor checks the appropriate box and no 10 CFR 50.59 REVIEW is required;

i. Signs and dates as Requestor and identifies the originating department;

j. Obtains approval to proceed from Department Supervisor (or designee); and

k. Returns Attachment A to the RA LE.

8. RA LE reviews the TRM Change Request Form, including supporting documentation, and documents the review by signing Attachment A. The review verifies that the following information or documentation is included:

a. Completed 10 CFR 50.59 REVIEW. If the changes are related to an approved NRC SE associated with a site specific Operating License or TS change and determined to be entirely bounded by the NRC SE, then only a copy of the SE is required to be attached and no 10 CFR 50.59 REVIEW is required. A 10 CFR 50.59 REVIEW is not required for an EDITORIAL CHANGE;

b. Identification of known documents requiring revisions; and

c. Completed UFSAR Change Request with supporting documentation, in accordance with appropriate plant procedures, if applicable.

9. If the TRM change is not an EDITORIAL CHANGE, the RA LE/TRM Change Requestor obtains SQR approval of the TRM change by performing the following:

   a. RA LE prepares the TRM Change SQR package. The SQR package shall include Attachment A (including completed 10 CFR 50.59 REVIEW or NRC SE) and the revised TRM pages. Attachment A is provided for the purpose of reviewing and finalizing the implementation requirements and ensuring the necessary actions have been initiated. RA LE shall assign Action Tracking (AT) items, as necessary, to track implementation requirements;

   b. TRM Change Requestor submits the TRM Change SQR package to the SQR Committee members for a preliminary review. The SQR composition shall include RA and Operating Departments in all cases; and

   c. TRM Change Requestor resolves preliminary review comments and finalizes the TRM Change SQR package.

10. The RAM shall determine the need for Plant Operations Review Committee (PORC) approval. The need for PORC approval shall be documented on Attachment A.

11. RA LE/TRM Change Requestor obtains PORC approval, if necessary.

12. After approval of the TRM changes by SQR/PORC, RA LE ensures that the controlled master electronic files are updated.

13. RA LE completes Attachment C, "Technical Requirements Manual Change Instruction Form," as follows:

a. Indicates the effective date of the TRM changes consistent with the SQR/PORC approval or TS amendment required implementation date. If the TRM change is a result of a TS Amendment, the update shall be implemented consistent with the implementation requirements of the TS Amendment. Otherwise, the update must be implemented by the date indicated on Attachment C;

b. Lists each page to be removed and inserted, including the Affected Page List; and

c. Provides the updated master file directory for updating Electronic Document Management System (EDMS), if applicable.

14. RA LE creates a TRM Change Package. The TRM Change Package shall consist of:

    1. TRM Change Instruction Form (Attachment C);

    2. Revised Affected Page List; and

    3. Revised TRM pages.

    One RA LE shall assemble and approve the TRM Change Package for distribution and a second RA LE shall perform a peer check to verify completeness of the TRM Change Package.

15. After verifying that SQR/PORC approval of the TRM changes has been obtained and that all AT items assigned to track implementation requirements have been completed, RA LE forwards the TRM Change Package to Station Records Management as notification of the need to update the onsite TRM controlled copies and EDMS, if applicable.

16. RA LE also forwards the TRM Change Package to Cantera Licensing (CL) Records Management as notification of the need to update the offsite (CL) TRM controlled copies and to transmit updates to the offsite (non-CL) TRM controlled copies.

17. Upon completion of updating the onsite TRM controlled copies and EDMS (if applicable), Station Records Management Supervisor signs and dates Attachment C and returns Attachment C to the RA LE.

18. Upon completion of updating the offsite (CL) TRM controlled copies and transmitting updates to the offsite (non-CL) TRM controlled copies, CL Records Management signs and dates Attachment C and returns Attachment C to the RA LE.

19. RA LE updates the TRM Change Request Log (Attachment B) with the following information:

    a. 10 CFR 50.59 REVIEW Number;

    b. SQR Number, if applicable;

    c. SQR Approval Date; and

    d. TRM change implementation date.

20. RA LE ensures that the documentation required to be maintained as a quality record is provided to Station Records Management for the purpose of record retention.

1.6 ACCEPTANCE CRITERIA

Not applicable.

1.7 LCOARS/COMPENSATORY MEASURES

An Issue Report may need to be generated to provide proper tracking and resolution of noted problems associated with the implementation of this Program.

The RAM will be responsible for ensuring that Program failures have been resolved.

1.8 REPORTING REQUIREMENTS

****
*   NOTE   *
*   *
* TRM changes requiring prior NRC approval shall be   *
* submitted in accordance with Reference 5.   *
*   *
****

TRM changes not requiring prior NRC approval, as described in Section 1.4 of this Program, shall be submitted to the NRC in accordance with 10 CFR 50.71(e).

1.9 CHANGE CONTROL

Changes to this Program, other than EDITORIAL CHANGES, shall include a 10 CFR 50.59 REVIEW and a SQR. The SQR composition shall include RA Department in all cases. For a change to this Program, PORC approval from all Stations is required. The concurrence shall be that the other Stations are implementing the same changes or that the changes have been reviewed and determined not to be applicable to the other Stations.

ATTACHMENT A
TECHNICAL REQUIREMENTS MANUAL CHANGE REQUEST FORM

1. Change Request #: ____________ Affected TRM Section(s): ______________________

2. Description of changes: ____
____
____

3. Reason for changes (attach all supporting documentation): __________________
____
____
____

4. Schedule Requirements:
Outage Related (check one) ☐ No ☐ Yes, Outage # __________
Other (explain) ____

5. Implementation Requirements (attach additional pages, as necessary):
Identify the impact of the changes on the following:

Affected	N/A	
☐	☐	UFSAR ______________________________
☐	☐	TS ______________________________
☐	☐	TS Bases ______________________________
☐	☐	NRC Safety Evaluation ______________________________
☐	☐	Fire Protection Report ______________________________
☐	☐	NRC Commitments ______________________________
☐	☐	Vendor Documentation ______________________________
☐	☐	Special Permits/Licenses ______________________________
☐	☐	Procedures ______________________________
☐	☐	Environmental Qualification ______________________________
☐	☐	Design Basis Documentation ______________________________
☐	☐	Engineering Calculations ______________________________
☐	☐	Drawings/Prints ______________________________
☐	☐	PRA Information ______________________________
☐	☐	Programs ______________________________
☐	☐	Reportability Manual ______________________________
☐	☐	QA Topical Report ______________________________
☐	☐	Passport ______________________________
☐	☐	Pre-Implementation Training Required ______________________________
☐	☐	Maintenance Rule ______________________________
☐	☐	Offsite Dose Calculation Manual ______________________________
☐	☐	Other ______________________________

6. Check one:
☐ 10 CFR 50.59 REVIEW Attached, 10 CFR 50.59 REVIEW #:__________________
☐ NRC SE Attached, Changes consistent with and entirely bounded by NRC SE
☐ EDITORIAL CHANGE, No 10 CFR 50.59 REVIEW required

7. Requestor: ____________________/____________________/____________________
(Signature) (Date) (Department)

8. Requesting Supervisor Approval: ____________________/____________________
(Signature) (Date)

9. PORC Approval Required: ☐ Yes ☐ No

10. Licensing Engineer Review: ____________________/____________________
(Signature) (Date)

ATTACHMENT B
TECHNICAL REQUIREMENTS MANUAL CHANGE REQUEST LOG

CR #	Brief Description of Changes	Affected Section(s)	10 CFR 50.59 REVIEW #	SQR #	SQR Approval Date	Implemented Date

ATTACHMENT C
TECHNICAL REQUIREMENTS MANUAL CHANGE INSTRUCTION FORM
FOR ONSITE/OFFSITE DISTRIBUTION AND FOR UPDATING EDMS

Braidwood/Byron/Dresden/LaSalle/QC (circle one) TRM Revision # ______

NOTE: This change is effective as of ____________________________ and shall be implemented by __________ . (SQR/PORC or Amendment Implementation Date)
(Date)

Approved for distribution: __________________________________/____________
(RA LE Signature) (Date)

Verified: __________________________________/____________
(RA LE Signature) (Date)

REMOVE Section	REMOVE Page	INSERT Section	INSERT Page	UPDATE EDMS Section	UPDATE EDMS Page
Affected Page List	All	Affected Page List	All	N/A	N/A

ATTACHMENT C
TECHNICAL REQUIREMENTS MANUAL CHANGE INSTRUCTION FORM
FOR ONSITE/OFFSITE DISTRIBUTION AND FOR UPDATING EDMS

Braidwood/Byron/Dresden/LaSalle/QC (circle one) TRM Revision # ______

Station Records Management:

Onsite Distribution Completed: ____________________________/__________________
(Station Records Mgmt. Supr.) (Date)

EDMS Update Completed: ____________________________/__________________
(Station Records Mgmt. Supr.) (Date)

** Return this sheet to: Regulatory Assurance
Braidwood/Byron/Dresden/LaSalle/QC (circle one) Station

CL Records Management:

Offsite (CL) Distribution Completed: _________________________/___________________
(CL Records Mgmt.) (Date)

Offsite (non-CL) Distribution Transmitted: _________________________/___________________
(CL Records Mgmt.) (Date)

** Return this sheet to: Regulatory Assurance
Braidwood/Byron/Dresden/LaSalle/QC (circle one) Station

Offsite (non-CL) Controlled Copy Holders:

Offsite (non-CL) Distribution Completed: _________________________/___________________
(Signature) (Date)

** Return this sheet to: EXELON GENERATION COMPANY, LLC
LICENSING AND REGULATORY AFFAIRS DEPARTMENT
4300 WINFIELD ROAD
WARRENVILLE, IL 60555

ATTACHMENT D
TECHNICAL REQUIREMENTS MANUAL CHANGE APPLICABILITY REVIEW FORM

Any change to a Station's Technical Requirements Manual (TRM) shall be transmitted to the Regulatory Assurance Managers (RAMs) at each of the other Stations. The RAM will review the TRM change for applicability at their respective Station. Review of applicability shall be documented on this Attachment and forwarded to the Regulatory Assurance Licensing Engineer(s) at the Station(s) making the change.

Braidwood/Byron/Dresden/LaSalle/QC (circle one)

TRM Section(s)/Title(s): ____________________

Description of the change: ____________________

____

____

____

Braidwood RAM Review: ____________ / ____________
(Signature) (Date)

Change Applicable: ☐ Yes ☐ No

Byron RAM Review: ____________ / ____________
(Signature) (Date)

Change Applicable: ☐ Yes ☐ No

Dresden RAM Review: ____________ / ____________
(Signature) (Date)

Change Applicable: ☐ Yes ☐ No

LaSalle RAM Review: ____________ / ____________
(Signature) (Date)

Change Applicable: ☐ Yes ☐ No

QC RAM Review: ____________ / ____________
(Signature) (Date)

Change Applicable: ☐ Yes ☐ No

** Return this sheet to: Regulatory Assurance
Braidwood/Byron/Dresden/LaSalle/QC (circle one) Station

Table H-1 (page 1 of 1)
Response Times

	FUNCTION	RESPONSE TIME
1	Turbine Bypass Valve	
	Bypass Valves: (analysis assumes one Bypass Valve out of service)	
	Delay to first opening (msec after TSV full closure)	50 msec
	5% of entire bank* (msec after TSV full closure)	100 msec
	80% of entire bank* (msec after TSV full closure)	240 msec
	100% of entire bank* (msec after TSV full closure)	450 msec
	* entire bank defined as 8 valves open.	
2	Reactor Protection System Response Time	< 50 msec[(a)]

(a) Neutron detectors are exempt from response time testing. As measured from the opening of the sensor contact up to and including the opening of the trip actuator.

APPENDIX I

Surveillance Frequency Control Program

(Surveillance Frequencies)

Surveillance Frequency Control Program

The Surveillance Frequency Control Program (SFCP) is described in Technical Specifications (TS) Section 5.5.14, “Surveillance Frequency Control Program.” The program provides the administrative controls for modifying[1] surveillance frequencies. The program ensures that Surveillance Requirements (SRs) specified in the TS are performed at intervals sufficient to assure the associated Limiting Conditions for Operation (LCO) are met.

The SFCP program document contains the following sections:

I. Program Description

II. Definitions

III. Revision Summary

IV. Table 1, “Surveillance Requirement Frequencies”

V. Table 2, “Surveillance Requirement Bases”

The program document is retained as Appendix I of the Technical Requirements Manual (TRM). However, the process for revising the SFCP is governed by specific procedures (see Program Description below). Accordingly, the TRM change process (i.e., TRM Appendix G) does not apply to SFCP updates (although a TRM change number will be assigned for tracking purposes).

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[1] SFCP monitoring applies to Surveillance Frequencies modified by the SFCP program (not to Surveillance Frequencies in effect at the time of implementation of License Amendments 248/243).

I. Program Description

Table 1 includes the periodic surveillances that were relocated to SFCP control as part of License Amendments 248/243 for Quad Cities Unit 1 and Unit 2 respectfully. Each surveillance frequency is associated with a corresponding TS SR (identified by TS SR number). Table 2 provides a bases description for each SR.

Changes to the type or scope of testing (e.g., Channel Check, Channel Functional Test, or Channel Calibration) are not allowed without prior NRC approval. The specified frequencies ensure SRs are performed at intervals sufficient to assure associated Limiting Conditions for Operation (LCOs) are met.

Changes to the information in Tables 1 and 2 may occur for one of two reasons:

1. Addition, deletion, or modification of the associated TS SR through a license amendment request, or

2. A change to a surveillance frequency in accordance with the SFCP and associated implementing procedures. Changes to individual surveillance frequencies are evaluated using the methodology provided in NEI 04-10, "Risk-Informed Method for Control of Surveillance Frequencies."

Changes to surveillance frequencies are permitted under the SFCP program, which is governed by ER-AA-425, “Implementation of the Technical Specification Surveillance Frequency Control Program,” and associated Training & Reference Material (T&RMs).

Table 1 includes a reference to the TS SR number, a surveillance description, frequency, denotation if the TS SR is conditioned[2], and the current revision. Table 2 provides the Bases for each SR frequency. The Descriptions is a summary description of the referenced TS SR which is provided for information purposes only and is not intended to be a substitute for the actual TS requirements. Refer to the TS for the specific action required by each respective SR identified in the list.

As noted in Tables 1 and 2, surveillance frequencies beyond Revision 0 have been evaluated in accordance with TS Section 5.5.14, “Surveillance Frequency Control Program.” Surveillance frequencies at Revision 0 reflect the approved licensing basis upon initial SFCP implementation.

The provisions of TS SR 3.0.2 and 3.0.3 are applicable to the frequencies established in the SFCP.

Noncompliance with the frequencies specified in the SFCP (e.g., a missed surveillance) requires generation of an Issue Report in accordance with LS-AA-125. Based on the guidance provided in NUREG-1022, "Event Reporting Guidelines, 10 CFR 50.72 and 50.73," Rev. 2, missed surveillances are not reportable as a condition prohibited by TS unless the surveillance, once performed, indicates that the equipment was not capable of performing its specified safety function(s) for a period of time longer than allowed by TS.

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[2] A conditioned SR has more than one frequency element that is dependent on plant conditions. Refer to the TS.

II. Definitions

STAGGERED TEST BASIS	A STAGGERED TEST BASIS shall consist of the testing of one of the systems, subsystems, channels, or other designated components during the interval specified by the Surveillance Frequency, so that all systems, subsystems, channels, or other designated components are tested during *n* Surveillance Frequency intervals, where *n* is the total number of systems, subsystems, channels, or other designated components in the associated function.

III. Revision Summary

Rev.	Description	Approval Date
0	Initial SFCP implementation	4/22/2011
1	Modified the frequency for SR 3.3.1.1.5 from 7 days to 31 days in accordance with STI Change Package QC-14-001. This change was distributed under TRM change number QC-TRM-14-003. Administrative change to Section I (Program Description) to add reference to ER-AA-425 and associated T&RMs, which govern changes to the SFCP. When the SFCP was initially implemented (i.e., Rev. 0), procedural guidance had not been developed.	9/22/2014 (PORC 14-14)
2	Modified the frequency for SR 3.8.1.10 (12)(17)(19) from 24 months to 24 months on a STAGGERED TEST BASIS in accordance with STI Change Package QC-14-002. This change was distributed under TRM change number QC-TRM-14-005.	12/19/2014 (PORC 14-18)
3	Modified or Added frequencies associated with licensing amendments 257/252 for the gas management program.	09/28/2015 (NRC SER Letter dated 06/19/2015)
4	Modified the frequency for SR 3.9.1.1 and 3.9.2.2 from 7 days to 30 days in accordance with STI change package QC-15-002. This change was distributed under TRM change number QC-TRM-16-005.	03/21/2016 (PORC 16-05)
5	Modified the frequency for SR 3.6.1.8.2 from 31 days to 92 days in accordance with STI change package QC-15-001. This change was distributed under TRM change number QC-TRM-16-007.	06/16/2016 (PORC 16-09)
6	Modified the frequency for SR 3.8.4.7 from 24 months to 48 months in accordance with STI change package QC-17-002. Modified the frequency for SR 3.3.5.1.7 Functions 1.c and 2.c from 24 months to 48 months in accordance with STI change package QC-17-003.	3/9/2018 (PORC 18-06 for STI QC-17-002) 4/19/18 (PORC 18-10 for STI QC-17-003)
7	Modified the frequency for SR 3.1.4.2 from 120 days of power operation to 240 days of power operation in accordance with STI change package QC-16-002. Modified the frequency for SR 3.3.6.1.7 Functions 1.a, 1.b, 1.d. 1.e, 2.a & 2.b from 24 months to 48 months in accordance with STI change package QC-17-005. Modified the frequency for SR 3.3.6.1.7 Function 5.b from 24 months to 48 months in accordance with STI change package	5/31/18 (PORC 18-13 for STI QC-16-002) 5/31/18 (PORC 18-13 for STI QC-17-004)

	QC-17-004. Modified the frequency for SR 3.3.7.1.6 Function 1, 2 & 3 from 24 months to 48 months in accordance with STI change package QC-17-005. Modified the frequency for SR 3.3.7.2.5 from 24 months to 48 months in accordance with STI change package QC-17-005. Modified the frequency for SR 3.6.1.3.7 from 24 months to 48 months in accordance with STI change package QC-17-005. NOTE: This is for Group 1 and 2 valves except 1(2)-1001-47/50, 1(2)-1001-29A/B, 1(2)-1601-57 and 1(2)-0737-1B. Modified the frequency for SR 3.6.1.3.7 from 24 months to 48 months in accordance with STI change package QC-17-004. NOTE: This is for Group 3 valves only. Modified the frequency for SR 3.6.4.2.3 from 24 months to 48 months in accordance with STI change package QC-17-005. NOTE: This change is only for the partial done under surveillances QCOS 1600-38 & 48 which verify SBGT relays actuate not actual SBGT SCIV's. Modified the frequency for SR 3.6.4.3.3 from 24 months to 48 months in accordance with STI change package QC-17-005. Modified the frequency for SR 3.7.4.3 from 24 months to 48 months in accordance with STI change package QC-17-005.	5/31/18 (PORC 18-13 for STI QC-17-005)
8	Modified the frequency of SR 3.3.1.1.5 from 31 days to 6 months in accordance with STI change package QC-14-001 Rev 1. Modified the frequency of SR 3.3.1.1.8 from 31 days to 6 months in accordance with STI change package QC-18-004.	9/10/18 (PORC 18-17 for STI QC-14-001 Rev 1) 8/20/18 (PORC 18-16 for STI QC-18-004)
9	Changes associated with RPV WIC license amendment 273/268. Move RCIC instrumentation surveillances from 3.3.5.2 to 3.3.5.3. Add new RPV WIC instrumentation surveillances under 3.3.5.2. 3.5.2 revised from ECCS-Shutdown to RPV Water Inventory Control. Surveillances revised and new adds under 3.5.2.	2/14/18 (NRC SER letter dated 1/28/19)

10	Modified the frequency of SR 3.3.1.1.10 function 5 from 92 days to 24 months in accordance with STI change package QC-16-003. Modified the frequency of SRs 3.4.7.2, 3.4.8.2, 3.5.1.1, 3.5.2.3, 3.5.3.1, 3.6.2.3.3, 3.6.2.4.3, 3.9.8.3 & 3.9.9.3 from 31 days to 184 days in accordance with STI change package QC-18-009. Modified the frequency of SR 3.6.4.3.1 from 31 days to 12 months in accordance with STI change package QC-18-003.	11/15/18 (PORC 18-21 for STI QC-16-003) 1/28/19 (PORC 19-01 for STI QC-18-009) 1/28/19 (PORC 19-01 for STI QC-18-003)
11	Modified the frequency of SR 3.3.1.3.1 from 184 days to 12 months in accordance with STI change package QC-18-011. Modified the frequency of SRs 3.5.1.7, 3.5.3.4 & 3.5.3.5 from 24 months to 48 months in accordance with STI change package QC-18-008.	2/25/19 (PORC 19-03 for STI QC-18-011) 2/25/19 (PORC 19-03 for STI QC-18-008)

Section IV

Surveillance Requirement Frequencies

TABLE 1

Surveillance Requirement Frequencies

Surveillance	Description[a]	Frequency	Conditioned[b]	Status[c]
3.1.3 Control Rod OPERABILITY				
3.1.3.1	Control rod position	24 hours	No	Rev. 0
3.1.3.3	Control rod exercising	31 days	No	Rev. 0
3.1.4 Control Rod Scram Times				
3.1.4.2	Control rod scram time testing	240 days cumulative operation in MODE 1	No	Rev. 7
3.1.5 Control Rod Scram Accumulators				
3.1.5.1	Control rod scram accumulator pressure	7 days	No	Rev. 0
3.1.6 Rod Pattern Control				
3.1.6.1	Verify analyzed rod position sequence	24 hours	No	Rev. 0
3.1.7 SLC System				
3.1.7.1	Volume of sodium pentaborate in SLC tank	24 hours	No	Rev. 0
3.1.7.2	Temperature of sodium pentaborate solution	24 hours	No	Rev. 0
3.1.7.3	Temperature of pump suction piping	24 hours	No	Rev. 0
3.1.7.4	Continuity of explosive charge	31 days	No	Rev. 0
3.1.7.5	Concentration of boron solution	31 days	Yes	Rev. 0
3.1.7.6	Manual valve position	31 days	No	Rev. 0
3.1.7.8	Flow through one SLC subsystem	24 months on a STAGGERED TEST BASIS	No	Rev. 0
3.1.7.9	Heat traced piping is unblocked	24 months	Yes	Rev. 0
3.1.8 SDV Vent and Drain Valves				
3.1.8.1	SDV vent & drain valves open	31 days	No	Rev. 0
3.1.8.2	Cycle SDV vent & drain valves	92 days	No	Rev. 0
3.1.8.3	SDV vent & drain valves scram response	24 months	No	Rev. 0
3.2.1 APLHGR				
3.2.1.1	APLHGR limits	24 hours	Yes	Rev. 0
3.2.2 MCPR				
3.2.2.1	MCPR limits	24 hours	Yes	Rev. 0
3.2.3 LHGR				
3.2.3.1	LHGR limits	24 hours	Yes	Rev. 0
3.3.1.1 RPS Instrumentation				
3.3.1.1.1	Channel Check	12 hours	No	Rev. 0
3.3.1.1.2	Absolute difference between APRM and calculated power	7 days	No	Rev. 0
3.3.1.1.3	Adjust channel to conform to calibrated flow signal	7 days	No	Rev. 0
3.3.1.1.4	Channel Functional Test	7 days	No	Rev. 0
3.3.1.1.5	Functional test of scram contactors	6 months	No	Rev. 8

TABLE 1

Surveillance Requirement Frequencies

Surveillance	Description[a]	Frequency	Conditioned[b]	Status[c]
3.3.1.1.7	IRM/APRM channel overlap	7 days	No	Rev. 0
3.3.1.1.8	Channel Functional Test	6 months	No	Rev. 8
3.3.1.1.9	Calibrate local power range monitors	2000 effective full power hours	No	Rev. 0
3.3.1.1.10 Table 3.3.1.1-1 Function 5	Channel Functional Test	24 months	No	Rev. 10
3.3.1.1.10 Table 3.3.1.1-1 Function 2.b Function 2.c Function 2.d Function 3 Function 4 Function 6 Function 7.a Function 7.b Function 8 Function 9 Function 10	Channel Functional Test	92 days	No	Rev. 10
3.3.1.1.11	Calibrate trip unit	92 days	No	Rev. 0
3.3.1.1.12	Channel Calibration	92 days	No	Rev. 0
3.3.1.1.13	Verify TSV/TCV trip functions not bypassed	92 days	No	Rev. 0
3.3.1.1.14	Channel Calibration	184 days	No	Rev. 0
3.3.1.1.15	Channel Functional Test	24 months	No	Rev. 0
3.3.1.1.16	Channel Calibration	24 months	No	Rev. 0
3.3.1.1.17	Logic System Functional Test	24 months	No	Rev. 0
3.3.1.1.18	Verify RPS Response Time	24 months on a STAGGERED TEST BASIS	No	Rev. 0
3.3.1.2 SRM Instrumentation				
3.3.1.2.1	Channel Check	12 hours	No	Rev. 0
3.3.1.2.2	Verify Operable SRM Detector	12 hours	No	Rev. 0
3.3.1.2.3	Channel Check	24 hours	No	Rev. 0
3.3.1.2.4	Verify SRM count rate	12 hours during CORE ALTERATIONS AND 24 hours	No	Rev. 0
3.3.1.2.5	Channel Functional Test	7 days	No	Rev. 0
3.3.1.2.6	Channel Functional Test	31 days	No	Rev. 0
3.3.1.2.7	Channel Calibration	24 months	No	Rev. 0
3.3.1.3 OPRM Instrumentation				
3.3.1.3.1	Channel Functional Test	12 months	No	Rev. 11
3.3.1.3.2	Calibrate LPRMs	2000 effective full power hours	No	Rev. 0
3.3.1.3.3	Channel Calibration	24 months	No	Rev. 0
3.3.1.3.4	Logic System Functional Test	24 months	No	Rev. 0

TABLE 1

Surveillance Requirement Frequencies

Surveillance	Description[a]	Frequency	Conditioned[b]	Status[c]
3.3.1.3.5	Verify OPRM not bypassed	24 months	No	Rev. 0
3.3.1.3.6	Verify RPS Response Time	24 months on a STAGGERED TEST BASIS	No	Rev. 0
3.3.2.1 Control Rod Block Instrumentation				
3.3.2.1.1	Channel Functional Test	92 days	No	Rev. 0
3.3.2.1.2	Channel Functional Test	92 days	No	Rev. 0
3.3.2.1.3	Channel Functional Test	92 days	No	Rev. 0
3.3.2.1.4	Channel Calibration	92 days	No	Rev. 0
3.3.2.1.5	Verify RBM not bypassed	92 days	No	Rev. 0
3.3.2.1.6	Verify RWM not bypassed	24 months	No	Rev. 0
3.3.2.1.7	Channel Functional Test	24 months	No	Rev. 0
3.3.2.2 Feed System and Main Turbine High Water Level Trip Instrumentation				
3.3.2.2.1	Channel Check	24 hours	No	Rev. 0
3.3.2.2.2	Channel Functional Test	92 days	No	Rev. 0
3.3.2.2.3	Calibrate trip unit	92 days	No	Rev. 0
3.3.2.2.4	Channel Calibration	24 months	No	Rev. 0
3.3.2.2.5	Logic System Functional Test	24 months	No	Rev. 0
3.3.3.1 PAM Instrumentation				
3.3.3.1.1	Channel Check	31 days	No	Rev. 0
3.3.3.1.2	Channel Calibration	24 months	No	Rev. 0
3.3.4.1 ATWS-RPT Instrumentation				
3.3.4.1.1	Channel Check	12 hours	No	Rev. 0
3.3.4.1.2	Calibrate trip unit	92 days	No	Rev. 0
3.3.4.1.3	Channel Functional Test	92 days	No	Rev. 0
3.3.4.1.4	Channel Calibration	24 months	No	Rev. 0
3.3.4.1.5	Logic System Functional Test	24 months	No	Rev. 0
3.3.5.1 ECCS Instrumentation				
3.3.5.1.1	Channel Check	12 hours	No	Rev. 0
3.3.5.1.2	Channel Functional Test	92 days	No	Rev. 0
3.3.5.1.3	Calibrate trip unit	92 days	No	Rev. 0
3.3.5.1.4	Channel Calibration	92 days	No	Rev. 0
3.3.5.1.5	Channel Calibration	184 days	No	Rev. 0
3.3.5.1.6	Channel Calibration	24 months	No	Rev. 0

TABLE 1

Surveillance Requirement Frequencies

Surveillance	Description[a]	Frequency	Conditioned[b]	Status[c]
3.3.5.1.7 Table 3.3.5.1-1 Function 1.a Function 1.b Function 1.d Function 1.e Function 2.a Function 2.b Function 2.d Function 2.e Function 2.f Function 2.g Function 2.h Function 2.i Function 2.j Function 2.k Function 3.a Function 3.b Function 3.c Function 3.d Function 3.e Function 3.f Function 3.g Function 4.a Function 4.b Function 4.c Function 4.d Function 4.e Function 4.f Function 5.a	Logic System Functional Test	24 months	No	Rev. 6
(cont'd) Function 5.b Function 5.c Function 5.d Function 5.e Function 5.f				
3.3.5.1.7 Table 3.3.5.1-1 Function 1.c Function 2.c	Logic System Function Test	48 Months for QCOS 1000-34 QCOS 1000-35 24 Months for all others	No	Rev. 6
3.3.5.2 RPV Water Inventory Control Instrumentation				
3.3.5.2.1	Channel Check	12 hours	No	Rev. 9
3.3.5.2.2	Channel Functional Test	92 days	No	Rev. 9
3.3.5.3 RCIC System Instrumentation				
3.3.5.3.1	Channel Check	12 hours	No	Rev. 9
3.3.5.3.2	Calibrate trip unit	92 days	No	Rev. 9
3.3.5.3.3	Channel Functional Test	92 days	No	Rev. 9

TABLE 1

Surveillance Requirement Frequencies

Surveillance	Description[a]	Frequency	Conditioned[b]	Status[c]
3.3.5.3.4	Channel Calibration	24 months	No	Rev. 9
3.3.5.3.5	Logic System Functional Test	24 months	No	Rev. 9
3.3.6.1 Primary Containment Isolation Instrumentation				
3.3.6.1.1	Channel Check	12 hours	No	Rev. 0
3.3.6.1.2	Channel Functional Test	92 days	No	Rev. 0
3.3.6.1.3	Calibrate trip unit	92 days	No	Rev. 0
3.3.6.1.4	Channel Calibration	92 days	No	Rev. 0
3.3.6.1.5	Channel Functional Test	24 months	No	Rev. 0
3.3.6.1.6	Channel Calibration	24 months	No	Rev. 0
3.3.6.1.7 Table 3.3.6.1-1 Function 1.c Function 2.c Function 3.a Function 3.b Function 3.c Function 3.d Function 3.e Function 4.a Function 4.b Function 4.c Function 4.d Function 5.a Function 6.a Function 6.b	Logic System Functional Test	24 months	No	Rev. 7
3.3.6.1.7 Table 3.3.6.1-1 Function 1.a Function 1.b Function 1.d Function 1.e Function 2.a Function 2.b Function 5.b	Logic System Functional Test	48 months for QCOS 1600-17 QCOS 1600-36 QCOS 1600-38 QCOS 1600-45 QCOS 1600-48 QCOS 1600-49 24 months for all others	No	Rev. 7
3.3.6.2 Secondary Containment Isolation Instrumentation				
3.3.6.2.1	Channel Check	12 hours	No	Rev. 0
3.3.6.2.2	Channel Functional Test	92 days	No	Rev. 0
3.3.6.2.3	Calibrate trip unit	92 days	No	Rev. 0
3.3.6.2.4	Channel Calibration	92 days	No	Rev. 0
3.3.6.2.5	Channel Calibration	24 months	No	Rev. 0
3.3.6.2.6	Logic System Functional Test	24 months	No	Rev. 0
3.3.6.3 Relief Valve Instrumentation				
3.3.6.3.1	Channel Calibration	24 months	No	Rev. 0
3.3.6.3.2	Logic System Functional Test	24 months	No	Rev. 0
3.3.7.1 CREV System Isolation Instrumentation				
3.3.7.1.1	Channel Check	12 hours	No	Rev. 0
3.3.7.1.2	Channel Functional Test	92 days	No	Rev. 0
3.3.7.1.3	Calibrate trip unit	92 days	No	Rev. 0
3.3.7.1.4	Channel Calibration	92 days	No	Rev. 0

TABLE 1

Surveillance Requirement Frequencies

Surveillance	Description[a]	Frequency	Conditioned[b]	Status[c]
3.3.7.1.5	Channel Calibration	24 months	No	Rev. 0
3.3.7.1.6 Table 3.3.7.1-1 Function 4 Function 5	Logic System Functional Test	24 months	No	Rev. 7
3.3.7.1.6 Table 3.3.7.1-1 Function 1 Function 2 Function 3	Logic System Functional Test	48 months for QCOS 1600-17 QCOS 1600-38 QCOS 1600-48 QCOS 1600-49 All others 24 months	No	Rev. 7
3.3.7.2 Mechanical Vacuum Pump Trip Instrumentation				
3.3.7.2.1	Channel Check	12 hours	No	Rev. 0
3.3.7.2.2	Channel Functional Test	92 days	No	Rev. 0
3.3.7.2.3	Channel Calibration	92 days	No	Rev. 0
3.3.7.2.4	Channel Calibration	24 months	No	Rev. 0
3.3.7.2.5	Logic System Functional Test	48 months	No	Rev. 7
3.3.8.1 LOP Instrumentation				
3.3.8.1.1	Channel Functional Test	18 months	No	Rev. 0
3.3.8.1.2	Channel Calibration	18 months	No	Rev. 0
3.3.8.1.3	Channel Functional Test	24 months	No	Rev. 0
3.3.8.1.4	Channel Calibration	24 months	No	Rev. 0
3.3.8.1.5	Logic System Functional Test	24 months	No	Rev. 0
3.3.8.2 RPS Electric Power Monitoring				
3.3.8.2.1	Channel Functional Test	184 days	No	Rev. 0
3.3.8.2.2	Channel Calibration	24 months	No	Rev. 0
3.3.8.2.3	System functional test	24 months	No	Rev. 0
3.4.1 Recirculation Loops Operating				
3.4.1.1	Recirc loop operability	24 hours	No	Rev. 0
3.4.2 Jet Pumps				
3.4.2.1	Jet pump operability	24 hours	No	Rev. 0
3.4.3 Safety and Relief Valves				
3.4.3.2	RV actuator manual actuation	24 months	No	Rev. 0
3.4.3.3	RV automatic actuation	24 months	No	Rev. 0
3.4.4 RCS Operational LEAKAGE				
3.4.4.1	RCS leakage within limits	12 hours	No	Rev. 0
3.4.5 RCS Leakage Detection Instrumentation				
3.4.5.1	Channel Check	12 hours	No	Rev. 0
3.4.5.2	Channel Functional Test	31 days	No	Rev. 0
3.4.5.3	Channel Calibration	24 months	No	Rev. 0
3.4.6 RCS Specific Activity				
3.4.6.1	Dose Equivalent I-131 specific activity	7 days	No	Rev. 0
3.4.7 RHR Shutdown Cooling System - Hot Shutdown				
3.4.7.1	Valve position verification	12 hours	No	Rev. 0
3.4.7.2	Verify locations susceptible to gas accumulation are sufficiently filled	184 days	No	Rev. 10

TABLE 1

Surveillance Requirement Frequencies

Surveillance	Description[a]	Frequency	Conditioned[b]	Status[c]
3.4.8 RHR Shutdown Cooling System - Cold Shutdown				
3.4.8.1	Valve position verification	12 hours	No	Rev. 0
3.4.8.2	Verify locations susceptible to gas accumulation are sufficiently filled	184 days	No	Rev. 10
3.4.9 RCS P/T Limits				
3.4.9.1	RCS pressure and temperature limits	30 minutes	No	Rev. 0
3.4.9.5	Reactor vessel head flange temperatures	30 minutes	No	Rev. 0
3.4.9.6	Reactor vessel head flange temperatures	30 minutes	No	Rev. 0
3.4.9.7	Reactor vessel head flange temperatures	12 hours	No	Rev. 0
3.4.10 Reactor Steam Dome Pressure				
3.4.10.1	Reactor steam dome pressure	12 hours	No	Rev. 0
3.5.1 ECCS - Operating				
3.5.1.1	Verify locations susceptible to gas accumulation are sufficiently filled	184 days	No	Rev. 10
3.5.1.2	Valve position verification	31 days	No	Rev. 0
3.5.1.3	Breaker alignment verification	31 days	No	Rev. 0
3.5.1.7	HPCI flow rate verification	48 months	No	Rev. 11
3.5.1.8	ECCS automatic initiation	24 months	No	Rev. 0
3.5.1.9	ADS automatic initiation	24 months	No	Rev. 0
3.5.1.10	Stroke ADS actuator	24 months	No	Rev. 0
3.5.1.11	LPCI swing bus transfer capability	24 months	No	Rev. 0
3.5.1.12	Verify ADS pneumatic supply header pressure	31 days	No	Rev. 0
3.5.2 RPV Water Inventory Control				
3.5.2.1	Verify Drain Time ≥ 36 hours	12 hours	No	Rev. 9
3.5.2.2	ECCS suppression pool / CCST water level	12 hours	No	Rev. 9
3.5.2.3	Verify locations susceptible to gas accumulation are sufficiently filled	184 days	No	Rev. 10
3.5.2.4	Valve position verification	31 days	No	Rev. 9
3.5.2.5	Operate through recirculation line for > 10 minutes	92 days	No	Rev. 9
3.5.2.6	Valve automatic isolation	24 months	No	Rev. 9
3.5.2.7	ECCS manual operation	24 months	No	Rev. 9

TABLE 1

Surveillance Requirement Frequencies

3.5.3 RCIC System				
3.5.3.1	Verify locations susceptible to gas accumulation are sufficiently filled	184 days	No	Rev. 10
3.5.3.2	Valve position verification	31 days	No	Rev. 0
3.5.3.3	RCIC flow rate	92 days	No	Rev. 0
3.5.3.4	RCIC flow rate	48 months	No	Rev. 11
3.5.3.5	RCIC automatic initiation	48 months	No	Rev. 11
3.6.1.1 Primary Containment				
3.6.1.1.2	Drywell-to-suppression chamber bypass leakage	24 months	Yes	Rev. 0
3.6.1.2 Primary Containment Air Lock				
3.6.1.2.2	Air lock door	24 months	No	Rev. 0
3.6.1.3 PCIVs				
3.6.1.3.1	Vent and purge valve verification	31 days	No	Rev. 0
3.6.1.3.2	Manual PCIV verification	31 days	No	Rev. 0
3.6.1.3.4	TIP shear valve continuity	31 days	No	Rev. 0
3.6.1.3.7	PCIV automatic isolation	48 months For Group 1, 2 & 3 valves under QCOS 1600-17 QCOS 1600-36 QCOS 1600-38 QCOS 1600-45 QCOS 1600-48 QCOS 1600-49 24 months for valves: 1(2)-1001-47/50 1(2)-1001-29A/B 1(2)-1601-57 1(2)-0737-1B All others 24 months	No	Rev. 7
3.6.1.3.8	Excess Flow Check Valve isolation	24 months	No	Rev. 0
3.6.1.3.9	Test explosive squib	24 months on a STAGGERED TEST BASIS	No	Rev. 0
3.6.1.4 Drywell Pressure				
3.6.1.4.1	Drywell pressure verification	12 hours	No	Rev. 0
3.6.1.5 Drywell Air Temperature				
3.6.1.5.1	Drywell air temperature verification	24 hours	No	Rev. 0
3.6.1.6 Low Set Relief Valves				
3.6.1.6.1	RV actuator manual actuation	24 months	No	Rev. 0
3.6.1.6.2	RV automatic actuation	24 months	No	Rev. 0

TABLE 1

Surveillance Requirement Frequencies

3.6.1.7 Reactor Building-to-Suppression Chamber Vacuum Breakers				
3.6.1.7.1	Vacuum breaker verification	14 days	No	Rev. 0
3.6.1.7.2	Vacuum breaker functional test	92 days	No	Rev. 0
3.6.1.7.3	Vacuum breaker setpoint verification	24 months	No	Rev. 0
3.6.1.8 Suppression Chamber-to-Drywell Vacuum Breakers				
3.6.1.8.1	Vacuum breaker verification	14 days	No	Rev. 0
3.6.1.8.2	Vacuum breaker functional test	92 days	Yes	Rev. 5
3.6.1.8.3	Vacuum breaker setpoint verification	24 months	No	Rev. 0
3.6.2.1 Suppression Pool Average Temperature				
3.6.2.1.1	Suppression pool temperature limits	24 hours	Yes	Rev. 0
3.6.2.2 Suppression Pool Water Level				
3.6.2.2.1	Suppression pool water level limits	24 hours	No	Rev. 0
3.6.2.3 RHR Suppression Pool Cooling				
3.6.2.3.1	Valve position verification	31 days	No	Rev. 0
3.6.2.3.3	Verify locations susceptible to gas accumulation are sufficiently filled	184 days	No	Rev. 10
3.6.2.4 RHR Suppression Pool Spray				
3.6.2.4.1	Valve position verification	31 days	No	Rev. 0
3.6.2.4.2	Spray nozzle unobstructed	10 years	No	Rev. 0
3.6.2.4.3	Verify locations susceptible to gas accumulation are sufficiently filled	184 days	No	Rev. 10
3.6.2.5 Drywell-to-Suppression Chamber Differential Pressure				
3.6.2.5.1	Differential pressure within limit	12 hours	No	Rev. 0
3.6.3.1 Primary Containment Oxygen Concentration				
3.6.3.1.1	Oxygen concentration within limit	7 days	No	Rev. 0
3.6.4.1 Secondary Containment				
3.6.4.1.1	Secondary containment vacuum	24 hours	No	Rev. 0
3.6.4.1.2	Secondary containment access door verification	31 days	No	Rev. 0
3.6.4.1.3	Secondary containment capability	24 months on a STAGGERED TEST BASIS for each SGT subsystem	No	Rev. 0
3.6.4.1.4	Secondary containment hatches	24 months	No	Rev. 0
3.6.4.2 SCIVs				
3.6.4.2.1	Valve position verification	31 days	No	Rev. 0
3.6.4.2.2	SCIV timing	92 days	No	Rev. 0
3.6.4.2.3	SCIV automatic isolation	48 months for QCOS 1600-38 & QCOS 1600-48 24 months for all others	No	Rev. 7

TABLE 1

Surveillance Requirement Frequencies

3.6.4.3 SGT System				
3.6.4.3.1	SGT operability	12 months	No	Rev. 10
3.6.4.3.3	SGT automatic isolation	48 months for QCOS 1600-38 & QCOS 1600-48 24 months for all others	No	Rev. 7
3.7.1 RHRSW System				
3.7.1.1	Valve position verification	31 days	No	Rev. 0
3.7.2 DGCW System				
3.7.2.1	Valve position verification	31 days	No	Rev. 0
3.7.2.2	Automatic pump start	24 months	No	Rev. 0
3.7.3 UHS				
3.7.3.1	Intake bay water level	24 hours	No	Rev. 0
3.7.3.2	Ultimate heat sink water temperature	24 hours	No	Rev. 0
3.7.4 CREV System				
3.7.4.1	CREV system operability	31 days	No	Rev. 0
3.7.4.3	CREV isolation	48 months for QCOS 1600-38 & QCOS 1600-48 24 months for all others	No	Rev. 7
3.7.5 Control Room Emergency Ventilation AC System				
3.7.5.1	CREV AC operability	24 months	No	Rev. 0
3.7.6 Main Condenser Offgas				
3.7.6.1	Gross gamma activity rate	31 days	Yes	Rev. 0
3.7.7 Main Turbine Bypass System				
3.7.7.1	Cycle main turbine bypass valve	92 days	No	Rev. 0
3.7.7.2	System functional test	24 months	No	Rev. 0
3.7.7.3	Turbine bypass system response time	24 months	No	Rev. 0
3.7.8 Spent Fuel Storage Pool Water Level				
3.7.8.1	Spent fuel pool water level	7 days	No	Rev. 0
3.7.9 SSMP System				
3.7.9.1	Valve position verification	31 days	No	Rev. 0
3.7.9.2	Pump flow rate	92 days	No	Rev. 0
3.8.1 AC Sources - Operating				
3.8.1.1	Breaker alignment	7 days	No	Rev. 0
3.8.1.2	DG operability	31 days	No	Rev. 0
3.8.1.3	DG load test	31 days	No	Rev. 0
3.8.1.4	Fuel oil tank levels	31 days	No	Rev. 0
3.8.1.5	Accumulated water removal - day tank	31 days	No	Rev. 0
3.8.1.6	Fuel oil transfer pump operability	31 days	No	Rev. 0
3.8.1.7	Accumulated water removal – storage tank	92 days	No	Rev. 0
3.8.1.8	DG start test	184 days	No	Rev. 0

TABLE 1

Surveillance Requirement Frequencies

3.8.1.9	Offsite power manual transfer test	24 months	No	Rev. 0
3.8.1.10	DG largest load reject	24 months on a STAGGERED TEST BASIS	No	Rev. 2
3.8.1.11	DG voltage test load reject	24 months	No	Rev. 0
3.8.1.12	Simulated loss of offsite power	24 months on a STAGGERED TEST BASIS	No	Rev. 2
3.8.1.13	DG ECCS initiation test	24 months	No	Rev. 0
3.8.1.14	DG automatic trip bypassed test	24 months	No	Rev. 0
3.8.1.15	DG endurance test	24 months	No	Rev. 0
3.8.1.16	DG hot restart test	24 months	No	Rev. 0
3.8.1.17	DG synchronization test	24 months on a STAGGERED TEST BASIS	No	Rev. 2
3.8.1.18	DG load sequence time delay relay	24 months	No	Rev. 0
3.8.1.19	LOOP / ECCS initiation	24 months on a STAGGERED TEST BASIS	No	Rev. 2
3.8.1.20	Simultaneous DG start	10 years	No	Rev. 0
3.8.3 Diesel Fuel Oil and Starting Air				
3.8.3.2	DG air start receiver pressure	31 days	No	Rev. 0
3.8.4 DC Sources - Operating				
3.8.4.1	Battery terminal voltage	7 days	No	Rev. 0
3.8.4.2	Corrosion verification	92 days	No	Rev. 0
3.8.4.3	Visual inspection	24 months	No	Rev. 0
3.8.4.4	Remove visible corrosion	24 months	No	Rev. 0
3.8.4.5	Verify connection resistance	24 months	No	Rev. 0
3.8.4.6	Battery charger test	24 months	No	Rev. 0
3.8.4.7	Battery service test	48 months	No	Rev. 6
3.8.4.8	Battery performance test	60 months	Yes	Rev. 0
3.8.6 Battery Cell Parameters				
3.8.6.1	Battery category A limits	7 days	No	Rev. 0
3.8.6.2	Battery category B limits	92 days	Yes	Rev. 0
3.8.6.3	Battery electrolyte temperature	92 days	No	Rev. 0
3.8.7 Distribution Systems - Operating				
3.8.7.1	Electrical distribution alignment	7 days	No	Rev. 0
3.8.8 Distribution Systems – Shutdown				
3.8.8.1	Electrical distribution alignment	7 days	No	Rev. 0
3.9.1 Refueling Equipment Interlocks				
3.9.1.1	Channel Functional Test	30 days	No	Rev. 4
3.9.2 Refuel Position One-Rod-Out Interlock				
3.9.2.1	Reactor mode switch locked	12 hours	No	Rev. 0
3.9.2.2	Channel Functional Test	30 days	No	Rev. 4
3.9.3 Control Rod Position				
3.9.3.1	Control rods fully inserted	12 hours	No	Rev. 0
3.9.5 Control Rod OPERABILITY - Refueling				
3.9.5.1	Control rod exercising	7 days	No	Rev. 0
3.9.5.2	Control rod scram accumulator pressure	7 days	No	Rev. 0

TABLE 1

Surveillance Requirement Frequencies

3.9.6 RPV Water Level - Irradiated Fuel				
3.9.6.1	RPV water level	24 hours	No	Rev. 0
3.9.7 RPV Water Level - New Fuel or Control Rods				
3.9.7.1	RPV water level	24 hours	No	Rev. 0
3.9.8 RHR – High Water Level				
3.9.8.1	Reactor coolant temperature	1 hour	No	Rev. 0
3.9.8.2	Valve position verification	12 hours	No	Rev. 0
3.9.8.3	Verify locations susceptible to gas accumulation are sufficiently filled	184 days	No	Rev. 10
3.9.9 RHR - Low Water Level				
3.9.9.1	Reactor coolant temperature	1 hour	No	Rev. 0
3.9.9.2	Valve position verification	12 hours	No	Rev. 0
3.9.9.3	Verify locations susceptible to gas accumulation are sufficiently filled	184 days	No	Rev. 10
3.10.1 Reactor Mode Switch Interlock Testing				
3.10.1.1	Control rods fully inserted	12 hours	No	Rev. 0
3.10.1.2	No core alterations in progress	24 hours	No	Rev. 0
3.10.2 Single Control Rod Withdrawal - Hot Shutdown				
3.10.2.2	Control rods disarmed	24 hours	No	Rev. 0
3.10.2.3	Control rods fully inserted	24 hours	No	Rev. 0
3.10.3 Single Control Rod Withdrawal - Cold Shutdown				
3.10.3.2	Control rods disarmed	24 hours	No	Rev. 0
3.10.3.3	Control rods fully inserted	24 hours	No	Rev. 0
3.10.3.4	Control rod withdrawal block inserted	24 hours	No	Rev. 0
3.10.4 Single CRD Removal - Refueling				
3.10.4.1	Control rods fully inserted	24 hours	No	Rev. 0
3.10.4.2	Control rods disarmed	24 hours	No	Rev. 0
3.10.4.3	Control rod withdrawal block inserted	24 hours	No	Rev. 0
3.10.4.5	No core alterations in progress	24 hours	No	Rev. 0
3.10.5 Multiple Control Rod Withdrawal - Refueling				
3.10.5.1	Fuel assemblies removed from core cells	24 hours	No	Rev. 0
3.10.5.2	Control rods fully inserted	24 hours	No	Rev. 0
3.10.5.3	Spiral reload sequence	24 hours	No	Rev. 0
3.10.7 SDM Test - Refueling				
3.10.7.4	No other core alterations in progress	12 hours	No	Rev. 0
3.10.7.6	CRD charging water header pressure	7 days	No	Rev. 0

TABLE 1

Surveillance Requirement Frequencies

Table 1 Notes:

(a) The description is provided for information purposes only and is not intended to be a verbatim description of the TS SR.
(b) If the surveillance is conditioned, the TS may require additional actions.
(c) Surveillance frequencies beyond Revision 0 have been evaluated in accordance with Technical Specifications Section 5.5.14, “Surveillance Frequency Control Program.” Surveillance frequencies at Revision 0 reflect the licensing basis prior to SFCP implementation.

Section V

Surveillance Requirement Bases

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.1.3	3.1.3.1	The 24 hour Frequency of this SR is based on operating experience related to expected changes in control rod position and the availability of control rod position indications in the control room.	Rev. 0
3.1.3	3.1.3.3	The 31 day Frequency takes into account operating experience related to changes in CRD performance.	Rev. 0
3.1.4	3.1.4.2	The 240 day Frequency is based on operating experience that has shown control rod scram times do not significantly change over an operating cycle. This Frequency is also reasonable based on the additional Surveillances done on the CRDs at more frequent intervals in accordance with LCO 3.1.3 and LCO 3.1.5, "Control Rod Scram Accumulators." The 240 day frequency is based on STI QC-16-002.	Rev. 7
3.1.5	3.1.5.1	The 7 day Frequency has been shown to be acceptable through operating experience and takes into account indications available in the control room.	Rev. 0
3.1.6	3.1.6.1	The 24 hour Frequency was developed considering that the primary check on compliance with the analyzed rod position sequence is performed by the RWM (LCO 3.3.2.1).	Rev. 0
3.1.7	3.1.7.1	The 24 hour Frequency is based on operating experience and has shown there are relatively slow variations in the measured parameters of volume and temperature.	Rev. 0
3.1.7	3.1.7.2	The 24 hour Frequency is based on operating experience and has shown there are relatively slow variations in the measured parameters of volume and temperature.	Rev. 0
3.1.7	3.1.7.3	The 24 hour Frequency is based on operating experience and has shown there are relatively slow variations in the measured parameters of volume and temperature.	Rev. 0
3.1.7	3.1.7.4	The 31 day Frequency is based on operating experience and has demonstrated the reliability of the explosive charge continuity.	Rev. 0
3.1.7	3.1.7.5	The 31 day Frequency of this Surveillance is appropriate because of the relatively slow variation of sodium pentaborate concentration between surveillances.	Rev. 0
3.1.7	3.1.7.6	The 31 day Frequency is based on engineering judgment and is consistent with the procedural controls governing valve operation that ensures correct valve positions.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.1.7	3.1.7.8	The pump and explosive valve tested should be alternated such that both complete flow paths are tested every 48 months at alternating 24 month intervals. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency; therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.1.7	3.1.7.9	The 24 month Frequency is acceptable since there is a low probability that the subject piping will be blocked due to precipitation of the boron from solution in the heat traced piping. This is especially true in light of the temperature verification of this piping required by SR 3.1.7.3.	Rev. 0
3.1.8	3.1.8.1	The 31 day Frequency is based on engineering judgment and is consistent with the procedural controls governing valve operation, which ensure correct valve positions.	Rev. 0
3.1.8	3.1.8.2	The 92 day Frequency is based on operating experience and takes into account the level of redundancy in the system design.	Rev. 0
3.1.8	3.1.8.3	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency; therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.2.1	3.2.1.1	The 24 hour Frequency is based on both engineering judgment and recognition of the slowness of changes in power distribution during normal operation.	Rev. 0
3.2.2	3.2.2.1	The 24 hour Frequency is based on both engineering judgment and recognition of the slowness of changes in power distribution during normal operation.	Rev. 0
3.2.3	3.2.3.1	The 24 hour Frequency is based on both engineering judgment and recognition of the slow changes in power distribution during normal operation.	Rev. 0
3.3.1.1	3.3.1.1.1	The 12 hour Frequency is based upon operating experience that demonstrates channel failure is rare.	Rev. 0
3.3.1.1	3.3.1.1.2	The 7 day Frequency is based upon operating experience.	Rev. 0
3.3.1.1	3.3.1.1.3	The Frequency of 7 days is based on engineering judgment, operating experience, and the reliability of this instrumentation.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.3.1.1	3.3.1.1.4	The frequency of 7 days provides an acceptable level of system average unavailability over the Frequency interval and is based on reliability analysis (Ref. 1).	Rev. 0
3.3.1.1	3.3.1.1.5	The Frequency of 6 months is based on STI Evaluation QC-14-001 Rev 1.	Rev. 8
3.3.1.1	3.3.1.1.7	A Frequency of 7 days is reasonable based on engineering judgment and the reliability of the IRMs and APRMs.	Rev. 0
3.3.1.1	3.3.1.1.8	The Frequency of 6 months is based on STI Evaluation QC-18-004.	Rev. 8
3.3.1.1	3.3.1.1.9	The 2000 effective full power hours (EFPH) Frequency is based on operating experience with LPRM sensitivity changes.	Rev. 0
3.3.1.1	3.3.1.1.10	The 92 day Frequency is based on a reliability analysis (Ref. 1). The 24 month frequency for Table 3.3.1.1-1 Function 5 is based on STI QC-16-003.	Rev. 10
3.3.1.1	3.3.1.1.11	The 92 day Frequency is based on a reliability analysis (Ref. 1).	Rev. 0
3.3.1.1	3.3.1.1.12	The Frequency is based upon the assumption of a 92 day calibration interval in determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.1.1	3.3.1.1.13	The Frequency of 92 days is based on engineering judgment and reliability of the components.	Rev. 0
3.3.1.1	3.3.1.1.14	The Frequency is based upon the assumption of a 184 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.1.1	3.3.1.1.15	The 24 month is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.	Rev. 0
3.3.1.1	3.3.1.1.16	The Frequency is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.1.1	3.3.1.1.17	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.3.1.1	3.3.1.1.18	RPS response time tests are conducted on a 24 month STAGGERED TEST BASIS. Note 2 requires STAGGERED TEST BASIS Frequency to be determined based on 4 channels per trip system, in lieu of the 8 channels specified in Table 3.3.1.1-1 for the MSIV Closure Function. This Frequency is based on the logic interrelationships of the various channels required to produce an RPS scram signal. The 24 month Frequency is consistent with the typical industry refueling cycle and is based upon plant operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.	Rev. 0
3.3.1.2	3.3.1.2.1	The Frequency of once every 12 hours for SR 3.3.1.2.1 is based on operating experience that demonstrates channel failure is rare.	Rev. 0
3.3.1.2	3.3.1.2.2	The 12 hour Frequency is based upon operating experience and supplements operational controls over refueling activities that include steps to ensure that the SRMs required by the LCO are in the proper quadrant.	Rev. 0
3.3.1.2	3.3.1.2.3	The Frequency of once every 12 hours for SR 3.3.1.2.1 is based on operating experience that demonstrates channel failure is rare. While in MODES 3 and 4, reactivity changes are not expected; therefore, the 12 hour Frequency is relaxed to 24 hours for SR 3.3.1.2.3.	Rev. 0
3.3.1.2	3.3.1.2.4	The Frequency is based upon channel redundancy and other information available in the control room, and ensures that the required channels are frequently monitored while core reactivity changes are occurring. When no reactivity changes are in progress, the Frequency is relaxed from 12 hours to 24 hours.	Rev. 0
3.3.1.2	3.3.1.2.5	This Frequency is reasonable, based on operating experience and on other Surveillances (such as a channel check), that ensure proper functioning between channel functional tests.	Rev. 0
3.3.1.2	3.3.1.2.6	Since core reactivity changes do not normally take place in MODES 3 and 4 and core reactivity changes are due only to control rod movement in MODE 2, the Frequency is extended from 7 days to 31 days. The 31 day Frequency is based on operating experience and on other Surveillances (such as channel check) that ensure proper functioning between channel functional tests.	Rev. 0
3.3.1.2	3.3.1.2.7	The Frequency considers the plant conditions required to perform the test, the ease of performing the test, and the likelihood of a change in the system or component status.	Rev. 0
3.3.1.3	3.3.1.3.1	A Frequency of 12 month provides an acceptable level of system average unavailability over the Frequency interval and is based on the reliability analysis (Ref. 2). The 12 month frequency is based on STI QC-18-011.	Rev. 11

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[a]
3.3.1.3	3.3.1.3.2	The 2000 effective full power hours (EFPH) Frequency is based on operating experience with LPRM sensitivity changes.	Rev. 0
3.3.1.3	3.3.1.3.3	The Frequency of 24 months is based upon the assumption of the magnitude of equipment drift provided by the equipment supplier (Ref. 2).	Rev. 0
3.3.1.3	3.3.1.3.4	The 24 month Frequency is based on engineering judgment and reliability of the components. Operating experience has shown these components usually pass the surveillance when performed at the 24 month Frequency.	Rev. 0
3.3.1.3	3.3.1.3.5	The Frequency of 24 months is based on engineering judgment and reliability of the components.	Rev. 0
3.3.1.3	3.3.1.3.6	RPS response time tests are conducted on a 24 month STAGGERED TEST BASES. This frequency is based upon operating experience, which shows that random failures of instrumentation components causing serious time degradation, but not channel failure, are infrequent.	Rev. 0
3.3.2.1	3.3.2.1.1	The Frequency of 92 days is based on a reliability analysis (Ref. 3).	Rev. 0
3.3.2.1	3.3.2.1.2	Operating experience has shown that these components usually pass the Surveillance when performed at the 92 day Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.3.2.1	3.3.2.1.3	Operating experience has shown that these components usually pass the Surveillance when performed at the 92 day Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.3.2.1	3.3.2.1.4	The Frequency is based upon the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.2.1	3.3.2.1.5	The 92 day Frequency is based on the actual trip setpoint methodology utilized for these channels.	Rev. 0
3.3.2.1	3.3.2.1.6	The Frequency is based on the trip setpoint methodology utilized for the low power setpoint channel.	Rev. 0
3.3.2.1	3.3.2.1.7	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency.	Rev. 0
3.3.2.2	3.3.2.2.1	The Frequency is based on operating experience that demonstrates channel failure is rare.	Rev. 0
3.3.2.2	3.3.2.2.2	The Frequency of 92 days is based on operating experience.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.3.2.2	3.3.2.2.3	The Frequency of 92 days is based on operating experience.	Rev. 0
3.3.2.2	3.3.2.2.4	The Frequency is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.2.2	3.3.2.2.5	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.	Rev. 0
3.3.3.1	3.3.3.1.1	The Frequency of 31 days is based upon plant operating experience, with regard to channel operability and drift, which demonstrates that failure of more than one channel of a given Function in any 31 day interval is rare.	Rev. 0
3.3.3.1	3.3.3.1.2	The 24 month Frequency for channel calibration of all other PAM instrumentation of Table 3.3.3.1-1 is based on operating experience and consistency with the refueling cycles.	Rev. 0
3.3.4.1	3.3.4.1.1	The Frequency is based upon operating experience that demonstrates channel failure is rare.	Rev. 0
3.3.4.1	3.3.4.1.2	The Frequency of 92 days is based on a reliability analysis (Ref. 4).	Rev. 0
3.3.4.1	3.3.4.1.3	The Frequency of 92 days is based on a reliability analysis (Ref. 4).	Rev. 0
3.3.4.1	3.3.4.1.4	The Frequency is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.4.1	3.3.4.1.5	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency.	Rev. 0
3.3.5.1	3.3.5.1.1	The Frequency is based upon operating experience that demonstrates channel failure is rare.	Rev. 0
3.3.5.1	3.3.5.1.2	The Frequency of 92 days is based on engineering judgment and the reliability of the equipment.	Rev. 0
3.3.5.1	3.3.5.1.3	The frequency of 92 days is based on a reliability analysis (Ref. 5).	Rev. 0
3.3.5.1	3.3.5.1.4	The Frequency is based upon the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.3.5.1	3.3.5.1.5	The Frequency is based upon the assumption of a 184 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.5.1	3.3.5.1.6	The Frequency is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.5.1	3.3.5.1.7	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. The 48 month frequency for QCOS 1000-34 and QCOS 1000-35 is based on STI QC-17-003 and is also based on two refuel cycles.	Rev. 6
3.3.5.2	3.3.5.2.1	The Frequency of once every 12 hours is based on operating experience that demonstrate channel failure is rare.	Rev. 9
3.3.5.2	3.3.5.2.2	The 92 day frequency is based on reliability analyses.	Rev. 9
3.3.5.3	3.3.5.3.1	The Frequency is based upon operating experience that demonstrates channel failure is rare. The channel check supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with the channels required by the LCO.	Rev. 9
3.3.5.3	3.3.5.3.2	The 92 day Frequency is based on operating experience.	Rev. 9
3.3.5.3	3.3.5.3.3	The 92 day Frequency is based on the reliability of the components.	Rev. 9
3.3.5.3	3.3.5.3.4	The Frequency is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 9
3.3.5.3	3.3.5.3.5	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.	Rev. 9
3.3.6.1	3.3.6.1.1	The Frequency is based on operating experience that demonstrates channel failure is rare.	Rev. 0
3.3.6.1	3.3.6.1.2	The 92 day Frequency is based on reliability analyses (Refs. 6 and 7).	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[a]
3.3.6.1	3.3.6.1.3	The 92 day Frequency is based on reliability analyses (Refs. 6 and 7).	Rev. 0
3.3.6.1	3.3.6.1.4	The Frequency is based on the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.6.1	3.3.6.1.5	The 24 month Frequency is based on engineering judgment and the reliability of the components.	Rev. 0
3.3.6.1	3.3.6.1.6	The Frequency is based on the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.6.1	3.3.6.1.7	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency. The 48 month frequency for QCOS 1600-17, 38, 48 & 49 is based on STI QC-17-004 and STI QC-17-005.	Rev. 7
3.3.6.2	3.3.6.2.1	The Frequency is based on operating experience that demonstrates channel failure is rare.	Rev. 0
3.3.6.2	3.3.6.2.2	The Frequency of 92 days is based on a reliability analysis (Refs. 6 and 7).	Rev. 0
3.3.6.2	3.3.6.2.3	The Frequency of 92 days is based on a reliability analysis (Refs. 6 and 7).	Rev. 0
3.3.6.2	3.3.6.2.4	The Frequency is based on the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.6.2	3.3.6.2.5	The Frequency is based on the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.6.2	3.3.6.2.6	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.	Rev. 0
3.3.6.3	3.3.6.3.1	The Frequency of once every 24 months is based on the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[a]
3.3.6.3	3.3.6.3.2	The Frequency of once every 24 months is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency.	Rev. 0
3.3.7.1	3.3.7.1.1	The Frequency is based upon operating experience that demonstrates channel failure is rare.	Rev. 0
3.3.7.1	3.3.7.1.2	The Frequency of 92 days is based on a reliability analysis (Ref. 4).	Rev. 0
3.3.7.1	3.3.7.1.3	The Frequency of 92 days is based on a reliability analysis (Ref. 4).	Rev. 0
3.3.7.1	3.3.7.1.4	The 92 day Frequency is based upon the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.7.1	3.3.7.1.5	The 24 month Frequency is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.7.1	3.3.7.1.6	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the surveillance when performed at the 24 month Frequency. The 48 month frequency for QCOS 1600-17, 38, 48 & 49 is based on STI QC-17-005.	Rev. 7
3.3.7.2	3.3.7.2.1	The Frequency is based upon operating experience that demonstrates channel failure is rare.	Rev. 0
3.3.7.2	3.3.7.2.2	The Frequency of 92 days is based on a reliability analysis (Ref. 7).	Rev. 0
3.3.7.2	3.3.7.2.3	The Frequency is based upon the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift associated with the channel, except for the radiation detectors, in the setpoint analysis.	Rev. 0
3.3.7.2	3.3.7.2.4	The Frequency is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift for the radiation detector in the setpoint analysis.	Rev. 0
3.3.7.2	3.3.7.2.5	The 48 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. The 48 month frequency is based on STI QC-17-005.	Rev. 7

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[a]
3.3.8.1	3.3.8.1.1	The Frequency of 18 months is based on operating experience with regard to channel operability and drift, which demonstrates that failure of more than one channel of a given Function in any 18 month interval is a rare event.	Rev. 0
3.3.8.1	3.3.8.1.2	The Frequency is based upon the assumption of an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.8.1	3.3.8.1.3	The Frequency of 24 months is based on operating experience with regard to channel operability and drift, which demonstrates that failure of more than one channel of a given Function in any 24 month interval is a rare event.	Rev. 0
3.3.8.1	3.3.8.1.4	The Frequency is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.8.1	3.3.8.1.5	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency.	Rev. 0
3.3.8.2	3.3.8.2.1	The 184 day Frequency is based on guidance provided in Generic Letter 91-09 (Ref. 8).	Rev. 0
3.3.8.2	3.3.8.2.2	The Frequency is based on the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.	Rev. 0
3.3.8.2	3.3.8.2.3	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.	Rev. 0
3.4.1	3.4.1.1	The 24 hour Frequency is consistent with the Surveillance Frequency for jet pump operability verification and has been shown by operating experience to be adequate to detect off normal jet pump loop flows in a timely manner.	Rev. 0
3.4.2	3.4.2.1	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.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[a]
3.4.3	3.4.3.2	The 24 month Frequency ensures that each solenoid for each relief valve is tested. The 24 month Frequency was developed based on the relief valve tests required by the ASME Code (Ref. 9). Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.4.3	3.4.3.3	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.4.4	3.4.4.1	In conjunction with alarms and other administrative controls, a 12 hour Frequency for this Surveillance is appropriate for identifying leakage and for tracking required trends (Ref. 10).	Rev. 0
3.4.5	3.4.5.1	The Frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.	Rev. 0
3.4.5	3.4.5.2	The Frequency of 31 days considers instrument reliability, and operating experience has shown it proper for detecting degradation.	Rev. 0
3.4.5	3.4.5.3	The Frequency of 24 months is a typical refueling cycle and considers channel reliability. Operating experience has proven this Frequency is acceptable.	Rev. 0
3.4.6	3.4.6.1	The 7 day Frequency is adequate to trend changes in the iodine activity level.	Rev. 0
3.4.7	3.4.7.1	The Frequency of 12 hours is sufficient in view of other visual and audible indications available to the operator for monitoring the RHR subsystem in the control room.	Rev. 0
3.4.7	3.4.7.2	184 days is based upon piping for this function being shared by LPCI mode of RHR, which is addressed by Tech Spec section 3.5.1.1. The 184 day frequency is based on STI QC-18-009.	Rev. 10
3.4.8	3.4.8.1	The Frequency of 12 hours is sufficient in view of other visual and audible indications available to the operator for monitoring the RHR subsystem in the control room.	Rev. 0
3.4.8	3.4.8.2	184 days is based upon piping for this function being shared by LPCI mode of RHR, which is addressed by Tech Spec section 3.5.1.1. The 184 day frequency is based on STI QC-18-009.	Rev. 10

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[a]
3.4.9	3.4.9.1	This 30 minute Frequency is considered reasonable in view of the control room indication available to monitor RCS status. Also, since temperature rate of change limits are specified in hourly increments, 30 minutes permits a reasonable time for assessment and correction of minor deviations.	Rev. 0
3.4.9	3.4.9.5	The 30 minute Frequency reflects the urgency of maintaining the temperatures within limits, and also limits the time that the temperature limits could be exceeded.	Rev. 0
3.4.9	3.4.9.6	The 30 minute Frequency reflects the urgency of maintaining the temperatures within limits, and also limits the time that the temperature limits could be exceeded.	Rev. 0
3.4.9	3.4.9.7	The 12 hour Frequency is reasonable based on the rate of temperature change possible at these temperatures.	Rev. 0
3.4.10	3.4.10.1	Operating experience has shown the 12 hour Frequency to be sufficient for identifying trends and verifying operation within safety analyses assumptions.	Rev. 0
3.5.1	3.5.1.1	The 184 day frequency for venting of discharge piping is based upon the gradual nature of void buildup in ECCS piping, the procedural controls governing system operation, and operating experience. In addition to the venting performed in accordance with SR 3.5.1.1, ultrasonic testing (UT) verifications are also performed on selected piping on a graded approach consistent with the commitments made in response to Generic Letter 2008-01. The 184 day frequency is based on STI QC-18-009.	Rev. 10
3.5.1	3.5.1.2	The 31 day Frequency of this SR was derived from the Inservice Testing Program requirements for performing valve testing at least once every 92 days. The Frequency of 31 days is further justified because the valves are operated under procedural control and because improper valve position would only affect a single subsystem. This Frequency has been shown to be acceptable through operating experience.	Rev. 0
3.5.1	3.5.1.3	The 31 day Frequency has been found acceptable based on engineering judgment and operating experience.	Rev. 0
3.5.1	3.5.1.7	The 48 month Frequency is based on the need to perform the Surveillance under the conditions that apply during a startup from a plant outage. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint. The 48 month frequency is based on STI QC-18-008.	Rev. 11

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.5.1	3.5.1.8	While this Surveillance can be performed with the reactor at power, operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.5.1	3.5.1.9	The 24 month Frequency is based on the need to perform the Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.5.1	3.5.1.10	Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.5.1	3.5.1.11	The Frequency of 24 months is based on the need to perform the Surveillance under the conditions that apply during a startup from a plant outage. Operating experience has shown that the components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.5.1	3.5.1.12	The 31 day Frequency takes into consideration administrative controls over operation of the nitrogen system and alarm for low nitrogen pressure.	Rev. 0
3.5.2	3.5.2.1	This frequency is selected because numerous indications of change in RPV water level are available to the Operators.	Rev. 9
3.5.2	3.5.2.2	The 12 hour Frequency of these SRs was developed considering operating experience related to suppression pool water level and CCST water level variations and instrument drift during the applicable modes. Furthermore, the 12 hour Frequency is considered adequate in view of other indications available in the control room, including alarms, to alert the operator to an abnormal suppression pool or CCST water level condition.	Rev. 9

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[a]
3.5.2	3.5.2.3	The 184 day frequency for venting of discharge piping is based upon the gradual nature of void buildup in ECCS piping, the procedural controls governing system operation, and operating experience. In addition to the venting performed in accordance with SR 3.5.2.2, ultrasonic testing (UT) verifications are also performed on selected piping on a graded approach consistent with the commitments made in response to Generic Letter 2008-01. The 184 day frequency is based on STI QC-18-009.	Rev. 10
3.5.2	3.5.2.4	The 31 day Frequency is appropriate because the valves are operated under procedural control and the probability of their being mispositioned during this time period is low.	Rev. 9
3.5.2	3.5.2.5	The 92 day frequency is consistent with the at-power testing.	Rev. 9
3.5.2	3.5.2.6	The 24 month frequency is consistent with similar valve actuation tests.	Rev. 9
3.5.2	3.5.2.7	The 24 month frequency is based on the need to perform the Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the SR when performed at the 24 month frequency, which is based on the refueling cycle. Therefore, the frequency was concluded to be acceptable from a reliability standpoint.	Rev. 9
3.5.3	3.5.3.1	The 184 day frequency for venting of discharge piping is based upon the gradual nature of void buildup in ECCS piping, the procedural controls governing system operation, and operating experience. In addition to the venting performed in accordance with SR 3.5.3.1, ultrasonic testing (UT) verifications are also performed on selected piping on a graded approach consistent with the commitments made in response to Generic Letter 2008-01. The 184 day frequency is based on STI QC-18-009.	Rev. 10
3.5.3	3.5.3.2	The 31 day Frequency of this SR was derived from the Inservice Testing Program requirements for performing valve testing at least once every 92 days. The Frequency of 31 days is further justified because the valves are operated under procedural control and because improper valve position would affect only the RCIC System. This Frequency has been shown to be acceptable through operating experience.	Rev. 0
3.5.3	3.5.3.3	A 92 day Frequency is consistent with the Inservice Testing Program requirements.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.5.3	3.5.3.4	The 48 month Frequency is based on the need to perform the Surveillance under conditions that apply during a startup from a plant outage. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint. The 48 month frequency is based on STI QC-18-008.	Rev. 11
3.5.3	3.5.3.5	While this Surveillance can be performed with the reactor at power, operating experience has shown that these components usually pass the SR when performed at the 48 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint. The 48 month frequency is based on STI QC-18-008.	Rev. 11
3.6.1.1	3.6.1.1.2	The leakage test is performed every 24 months. The 24 month Frequency was developed considering it is prudent that this Surveillance be performed during a unit outage and also in view of the fact that component failures that might have affected this test are identified by other primary containment SRs.	Rev. 0
3.6.1.2	3.6.1.2.2	Due to the purely mechanical nature of this interlock, and given that the interlock mechanism is not normally challenged when the primary containment air lock door is used for entry and exit (procedures require strict adherence to single door opening), this test is only required to be performed every 24 months. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage, and the potential for loss of primary containment OPERABILITY if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency. The 24 month Frequency is based on engineering judgment and is considered adequate given that the interlock is not challenged during the use of the air lock.	Rev. 0
3.6.1.3	3.6.1.3.1	The 31 day Frequency is consistent with other PCIV requirements discussed in SR 3.6.1.3.2.	Rev. 0
3.6.1.3	3.6.1.3.2	Since verification of position for PCIVs outside primary containment is relatively easy, the 31 day Frequency was chosen to provide added assurance that the PCIVs are in the correct positions.	Rev. 0
3.6.1.3	3.6.1.3.4	The 31 day Frequency is based on operating experience that has demonstrated the reliability of the explosive charge continuity.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.6.1.3	3.6.1.3.7	The 24 month Frequency was developed considering it is prudent that this Surveillance be performed only during a unit outage since isolation of penetrations would eliminate cooling water flow and disrupt the normal operation of many critical components. Operating experience has shown that these components usually pass this Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint. The 48 month frequency for QCOS 1600-17, 38, 48 & 49 is based on STI QC-17-004 and STI QC-17-005.	Rev. 7
3.6.1.3	3.6.1.3.8	The representative sample consists of an approximately equal number of EFCVs, such that each EFCV is tested at least once every 10 years (nominal). In addition, the EFCVs in the samples are representative of the various plant configurations, models, sizes, and operating environments. This ensures that any potentially common problem with a specific type or application of EFCV is detected at the earliest possible time. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. The nominal 10-year interval is based on performance testing as discussed in NEDO-32977-A (Ref. 11). Furthermore, any EFCV failures will be evaluated to determine if additional testing in that test interval is warranted to ensure overall reliability is maintained. Operating experience has demonstrated that these components are highly reliable and that failures to isolate are very infrequent. Therefore, testing of a representative sample was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.6.1.3	3.6.1.3.9	The Frequency of 24 months on a STAGGERED TEST BASIS is considered adequate given the administrative controls on replacement charges and the frequent checks of circuit continuity (SR 3.6.1.3.4).	Rev. 0
3.6.1.4	3.6.1.4.1	The 12 hour Frequency of this SR was developed, based on operating experience related to trending of drywell pressure variations during the applicable modes. Furthermore, the 12 hour Frequency is considered adequate in view of other indications available in the control room, including alarms, to alert the operator to an abnormal drywell pressure condition.	Rev. 0
3.6.1.5	3.6.1.5.1	The 24 hour Frequency of the SR was developed based on operating experience related to drywell average air temperature variations and temperature instrument drift during the applicable modes and the low probability of a DBA occurring between surveillances. Furthermore, the 24 hour Frequency is considered adequate in view of other indications available in the control room, including alarms, to alert the operator to an abnormal drywell air temperature condition.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.6.1.6	3.6.1.6.1	The 24 month Frequency was based on the relief valve tests required by the ASME Code (Ref. 9). The Frequency of 24 months ensures that each solenoid for each low set relief valve is tested. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.6.1.6	3.6.1.6.2	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.6.1.7	3.6.1.7.1	The 14 day Frequency is based on engineering judgment, is considered adequate in view of other indications of vacuum breaker status available to operations personnel, and has been shown to be acceptable through operating experience.	Rev. 0
3.6.1.7	3.6.1.7.2	The 92 day Frequency of this SR was developed based upon Inservice Testing Program requirements to perform valve testing at least once every 92 days.	Rev. 0
3.6.1.7	3.6.1.7.3	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. For this plant, the 24 month Frequency has been shown to be acceptable, based on operating experience, and is further justified because of other surveillances performed at shorter Frequencies that convey the proper functioning status of each vacuum breaker.	Rev. 0
3.6.1.8	3.6.1.8.1	The 14 day Frequency is based on engineering judgment, is considered adequate in view of other indications of vacuum breaker status available to operations personnel, and has been shown to be acceptable through operating experience.	Rev. 0
3.6.1.8	3.6.1.8.2	The 92 day Frequency of this SR was developed, based on Inservice Testing Program requirements to perform valve testing at least once every 92 days.	Rev. 5
3.6.1.8	3.6.1.8.3	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. The 24 month Frequency has been shown to be acceptable, based on operating experience, and is further justified because of other surveillances performed at shorter Frequencies that convey the proper functioning status of each vacuum breaker.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[a]
3.6.2.1	3.6.2.1.1	The 24 hour Frequency has been shown, based on operating experience, to be acceptable.	Rev. 0
3.6.2.2	3.6.2.2.1	The 24 hour Frequency has been shown to be acceptable based on operating experience. Furthermore, the 24 hour Frequency is considered adequate in view of other indications available in the control room, including alarms, to alert the operator to an abnormal suppression pool water level condition.	Rev. 0
3.6.2.3	3.6.2.3.1	The Frequency of 31 days is justified because the valves are operated under procedural control, improper valve position would affect only a single subsystem, the probability of an event requiring initiation of the system is low, and the system is a manually initiated system. This Frequency has been shown to be acceptable based on operating experience.	Rev. 0
3.6.2.3	3.6.2.3.3	The 184 day frequency for venting of discharge piping is based upon the gradual nature of void buildup in ECCS piping, the procedural controls governing system operation, and operating experience. The 184 day frequency is based on STI QC-18-009.	Rev. 10
3.6.2.4	3.6.2.4.1	The Frequency of 31 days is justified because the valves are operated under procedural control, improper valve position would affect only a single subsystem, the probability of an event requiring initiation of the system is low, and the system is a manually initiated system. This Frequency has been shown to be acceptable based on operating experience.	Rev. 0
3.6.2.4	3.6.2.4.2	The 10 year Frequency is adequate to detect degradation in performance due to the passive nozzle design and has been shown to be acceptable through operating experience.	Rev. 0
3.6.2.4	3.6.2.4.3	The 184 day frequency for venting of discharge piping is based upon the gradual nature of void buildup in ECCS piping, the procedural controls governing system operation, and operating experience. The 184 day frequency is based on STI QC-18-009.	Rev. 10
3.6.2.5	3.6.2.5.1	The 12 hour Frequency of this SR was developed based on operating experience relative to differential pressure variations and pressure instrument drift during applicable modes and by assessing the proximity to the specified LCO differential pressure limit. Furthermore, the 12 hour Frequency is considered adequate in view of other indications available in the control room, including alarms, to alert the operator to an abnormal pressure condition.	Rev. 0
3.6.3.1	3.6.3.1.1	The 7 day Frequency is based on the slow rate at which oxygen concentration can change and on other indications of abnormal conditions (which could lead to more frequent checking by operators in accordance with plant procedures). Also, this Frequency has been shown to be acceptable through operating experience.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.6.4.1	3.6.4.1.1	The 24 hour Frequency of this SR was developed based on operating experience related to secondary containment vacuum variations during the applicable modes and the low probability of a DBA occurring. Furthermore, the 24 hour Frequency is considered adequate in view of other indications available in the control room, including alarms, to alert the operator to an abnormal secondary containment vacuum condition.	Rev. 0
3.6.4.1	3.6.4.1.2	The 31 day Frequency has been shown to be adequate, based on operating experience, and is considered adequate in view of the other indications of door status that are available to the operator.	Rev. 0
3.6.4.1	3.6.4.1.3	The SGT subsystem used for this Surveillance is staggered to ensure that in addition to the requirements of LCO 3.6.4.3, either SGT subsystem will perform this test. Operating experience has shown the secondary containment boundary usually passes the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.6.4.1	3.6.4.1.4	The 24 month Frequency is considered adequate in view of the existing administrative controls on equipment hatches.	Rev. 0
3.6.4.2	3.6.4.2.1	Since these SCIVs are readily accessible to personnel during normal operation and verification of their position is relatively easy, the 31 day Frequency was chosen to provide added assurance that the SCIVs are in the correct positions.	Rev. 0
3.6.4.2	3.6.4.2.2	The 92 day frequency is based on operating experience.	Rev. 0
3.6.4.2	3.6.4.2.3	While this Surveillance can be performed with the reactor at power, operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint. The 48 month frequency for QCOS 1600-38 & 48 is based on STI QC-17-005. This change is only for the SR partial done surveillances QCOS 1600-38 & 48 which verify SBGT relays actuate, not actual SCIVs.	Rev. 7
3.6.4.3	3.6.4.3.1	The 12 month Frequency was developed in consideration of the known reliability of fan motors and controls and the redundancy available in the system. The 12 month frequency is based on STI QC-18-003.	Rev. 10

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.6.4.3	3.6.4.3.3	While this Surveillance can be performed with the reactor at power, operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was found to be acceptable from a reliability standpoint. The 48 month frequency for QCOS 1600-38 & 48 is based on STI QC-17-005.	Rev. 7
3.7.1	3.7.1.1	The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve positions.	Rev. 0
3.7.2	3.7.2.1	The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve positions.	Rev. 0
3.7.2	3.7.2.2	Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based at the refueling cycle. Therefore, this Frequency is concluded to be acceptable from a reliability standpoint.	Rev. 0
3.7.3	3.7.3.1	The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable modes.	Rev. 0
3.7.3	3.7.3.2	The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable modes.	Rev. 0
3.7.4	3.7.4.1	As the environmental and normal operating conditions of this system are not severe, testing the system once every month provides an adequate check on this system. Furthermore, the 31 day Frequency is based on the known reliability of the equipment.	Rev. 0
3.7.4	3.7.4.3	Operating experience has shown that these components normally pass the SR when performed at the 24 month Frequency. The Frequency of 24 months is based on industry operating experience and is consistent with the typical refueling cycle. Therefore, the Frequency was found to be acceptable from a reliability standpoint. The 48 month frequency for QCOS 1600-38 & 48 is based on STI QC-17-005.	Rev. 7
3.7.5	3.7.5.1	The 24 month Frequency is appropriate since significant degradation of the Control Room Emergency Ventilation AC System is not expected over this time period.	Rev. 0
3.7.6	3.7.6.1	The 31 day Frequency is adequate in view of other instrumentation that continuously monitor the offgas, and is acceptable, based on operating experience.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.7.7	3.7.7.1	The 92 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve positions. Operating experience has shown that these components usually pass the SR when performed at the 92 day Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.	Rev. 0
3.7.7	3.7.7.2	The 24 month Frequency is based on the need to perform this Surveillance under conditions that apply during a unit outage and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.7.7	3.7.7.3	The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.7.8	3.7.8.1	The 7 day Frequency is acceptable, based on operating experience, considering that the water volume in the pool is normally stable, and all water level changes are controlled by unit procedures.	Rev. 0
3.7.9	3.7.9.1	The 31 day Frequency of this SR was derived from the Inservice Testing Program requirements for performing valve testing at least once every 92 days. The Frequency of 31 days is further justified because the valves are operated under procedural control and because improper valve position would affect only the SSMP System. This Frequency has been shown to be acceptable through operating experience.	Rev. 0
3.7.9	3.7.9.2	A 92 day Frequency is consistent with the Inservice Testing Program requirements.	Rev. 0
3.8.1	3.8.1.1	The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.	Rev. 0
3.8.1	3.8.1.2	The 31 day Frequency is consistent with Regulatory Guide 1.9 (Ref. 12). This frequency provide adequate assurance of DG operability, while minimizing degradation resulting from testing.	Rev. 0
3.8.1	3.8.1.3	The 31 day Frequency for this Surveillance is consistent with Regulatory Guide 1.9 (Ref. 12).	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[a]
3.8.1	3.8.1.4	The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and facility operators would be aware of any large uses of fuel oil during this period.	Rev. 0
3.8.1	3.8.1.5	The Surveillance Frequency is established by Regulatory Guide 1.137 (Ref. 13).	Rev. 0
3.8.1	3.8.1.6	The Frequency for this SR is consistent with the Frequency for testing the DGs in SR 3.8.1.3.	Rev. 0
3.8.1	3.8.1.7	The Surveillance Frequency is established by Regulatory Guide 1.137 (Ref. 13).	Rev. 0
3.8.1	3.8.1.8	The 184 day Frequency is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 14). This Frequency provides adequate assurance of DG operability, while minimizing degradation resulting from testing.	Rev. 0
3.8.1	3.8.1.9	The 24 month Frequency of the Surveillance is based on engineering judgment taking into consideration the plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed on the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.8.1	3.8.1.10	The Frequency of 24 months on a STAGGERED TEST BASIS is based on STI Evaluation QC-14-002.	Rev. 2
3.8.1	3.8.1.11	The 24 month Frequency takes into consideration the plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.	Rev. 0
3.8.1	3.8.1.12	The Frequency of 24 months on a STAGGERED TEST BASIS is based on STI Evaluation QC-14-002.	Rev. 2
3.8.1	3.8.1.13	The Frequency of 24 months takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with the expected fuel cycle lengths.	Rev. 0
3.8.1	3.8.1.14	The 24 month Frequency is based on engineering judgment, takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.	Rev. 0
3.8.1	3.8.1.15	The 24 month Frequency takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.	Rev. 0
3.8.1	3.8.1.16	The 24 month Frequency takes into consideration the plant conditions required to perform the Surveillance, and is intended to be consistent with the expected fuel cycle lengths.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.8.1	3.8.1.17	The Frequency of 24 months on a STAGGERED TEST BASIS is based on STI Evaluation QC-14-002.	Rev. 2
3.8.1	3.8.1.18	The Frequency of 24 months takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.	Rev. 0
3.8.1	3.8.1.19	The Frequency of 24 months on a STAGGERED TEST BASIS is based on STI Evaluation QC-14-002.	Rev. 2
3.8.1	3.8.1.20	The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.9 (Ref. 12).	Rev. 0
3.8.3	3.8.3.2	The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.	Rev. 0
3.8.4	3.8.4.1	The 7 day Frequency is conservative when compared with manufacturers recommendations and IEEE-450 (Ref. 15).	Rev. 0
3.8.4	3.8.4.2	The Frequency for these inspections, which can detect conditions that can cause power losses due to resistance heating, is 92 days. This Frequency is considered acceptable based on operating experience related to detecting corrosion trends.	Rev. 0
3.8.4	3.8.4.3	The 24 month Frequency for the Surveillance is based on engineering judgment. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.8.4	3.8.4.4	The 24 month Frequency for the Surveillance is based on engineering judgment. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.8.4	3.8.4.5	The 24 month Frequency for the Surveillance is based on engineering judgment. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.	Rev. 0
3.8.4	3.8.4.6	The Frequency is acceptable given the administrative controls existing to ensure adequate charger performance during these 24 month intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.	Rev. 0
3.8.4	3.8.4.7	The 48 month frequency is based on STI QC-17-002.	Rev. 6

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[a]
3.8.4	3.8.4.8	The Frequency for this test is normally 60 months consistent with the recommendations in IEEE-450 (Ref. 16).	Rev. 0
3.8.6	3.8.6.1	This SR verifies that Table 3.8.6-1 Category A battery cell parameters are consistent with IEEE-450 (Ref. 16), which recommends regular battery inspections.	Rev. 0
3.8.6	3.8.6.2	The quarterly inspection of specific gravity, voltage, and electrolyte level for each connected cell is consistent with IEEE-450 (Ref. 16).	Rev. 0
3.8.6	3.8.6.3	This Surveillance verification that the average temperature of representative cells is within limits is consistent with a recommendation of IEEE-450 (Ref. 16).	Rev. 0
3.8.7	3.8.7.1	The 7 day Frequency takes into account the redundant capability of the AC and DC electrical power distribution subsystems, redundant power supplies available to the essential service and instrument 120 VAC buses, and other indications available in the control room that alert the operator to bus and subsystem malfunctions.	Rev. 0
3.8.8	3.8.8.1	The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, as well as other indications available in the control room that alert the operator to subsystem malfunctions.	Rev. 0
3.9.1	3.9.1.1	The 30 day Frequency is based on engineering judgment and is considered adequate in view of other indications of refueling interlocks and their associated input status that are available to unit operations personnel.	Rev. 4
3.9.2	3.9.2.1	The Frequency of 12 hours is sufficient in view of other administrative controls utilized during refueling operations to ensure safe operation.	Rev. 0
3.9.2	3.9.2.2	The 30 day Frequency is considered adequate because of demonstrated circuit reliability, procedural controls on control rod withdrawals, and visual indications available in the control room to alert the operator to control rods not fully inserted.	Rev. 4
3.9.3	3.9.3.1	The 12 hour Frequency takes into consideration the procedural controls on control rod movement during refueling as well as the redundant functions of the refueling interlocks.	Rev. 0
3.9.5	3.9.5.1	The 7 day Frequency takes into consideration equipment reliability, procedural controls over the scram accumulators, and control room alarms and indicating lights that indicate low accumulator charge pressures.	Rev. 0
3.9.5	3.9.5.2	The 7 day Frequency takes into consideration equipment reliability, procedural controls over the scram accumulators, and control room alarms and indicating lights that indicate low accumulator charge pressures.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.9.6	3.9.6.1	The Frequency of 24 hours is based on engineering judgment and is considered adequate in view of the large volume of water and the normal procedural controls on valve positions, which make significant unplanned level changes unlikely.	Rev. 0
3.9.7	3.9.7.1	The Frequency of 24 hours is based on engineering judgment and is considered adequate in view of the large volume of water and the normal procedural controls on valve positions, which make significant unplanned level changes unlikely.	Rev. 0
3.9.8	3.9.8.1	The 1 hour Frequency is based on the importance of the decay heat removal and coolant circulation function.	Rev. 0
3.9.8	3.9.8.2	The Frequency of 12 hours is sufficient in view of other visual and audible indications available to the operator for monitoring the RHR shutdown cooling subsystem in the control room.	Rev. 0
3.9.8	3.9.8.3	184 days is based upon piping for this function being shared by LPCI mode of RHR, which is addressed by Tech Spec section 3.5.2.2. The 184 day frequency is based on STI QC-18-009.	Rev. 10
3.9.9	3.9.9.1	The 1 hour Frequency is based on the importance of the decay heat removal and coolant circulation function.	Rev. 0
3.9.9	3.9.9.2	The Frequency of 12 hours is sufficient in view of other visual and audible indications available to the operator for monitoring the RHR subsystems in the control room.	Rev. 0
3.9.9	3.9.9.3	184 days is based upon piping for this function being shared by LPCI mode of RHR, which is addressed by Tech Spec section 3.5.2.2. The 184 day frequency is based on STI QC-18-009.	Rev. 10
3.10.1	3.10.1.1	The Surveillance is performed at a 12 hour Frequency to provide appropriate assurance that each operating shift is aware of and verifies compliance with these Special Operations LCO requirements.	Rev. 0
3.10.1	3.10.1.2	The Surveillance is performed at a 24 hour Frequency to provide appropriate assurance that each operating shift is aware of and verifies compliance with these Special Operations LCO requirements.	Rev. 0
3.10.2	3.10.2.2	The 24 hour Frequency is acceptable because of the administrative controls on control rod withdrawal, the protection afforded by the LCOs involved, and hardwire interlocks that preclude additional control rod withdrawals.	Rev. 0
3.10.2	3.10.2.3	The 24 hour Frequency is acceptable because of the administrative controls on control rod withdrawal, the protection afforded by the LCOs involved, and hardwire interlocks that preclude additional control rod withdrawals.	Rev. 0

TABLE 2

Surveillance Requirement Bases

TS Section	SR	Bases Description	Status[(a)]
3.10.3	3.10.3.2	The 24 hour Frequency is acceptable because of the administrative controls on control rod withdrawals, the protection afforded by the LCOs involved, and hardwire interlocks to preclude an additional control rod withdrawal.	Rev. 0
3.10.3	3.10.3.3	The 24 hour Frequency is acceptable because of the administrative controls on control rod withdrawals, the protection afforded by the LCOs involved, and hardwire interlocks to preclude an additional control rod withdrawal.	Rev. 0
3.10.3	3.10.3.4	The 24 hour Frequency is acceptable because of the administrative controls on control rod withdrawals, the protection afforded by the LCOs involved, and hardwire interlocks to preclude an additional control rod withdrawal.	Rev. 0
3.10.4	3.10.4.1	The 24 hour Frequency is acceptable, given the administrative controls on control rod removal and hardwire interlock to block an additional control rod withdrawal.	Rev. 0
3.10.4	3.10.4.2	The 24 hour Frequency is acceptable, given the administrative controls on control rod removal and hardwire interlock to block an additional control rod withdrawal.	Rev. 0
3.10.4	3.10.4.3	The 24 hour Frequency is acceptable, given the administrative controls on control rod removal and hardwire interlock to block an additional control rod withdrawal.	Rev. 0
3.10.4	3.10.4.5	The 24 hour Frequency is acceptable, given the administrative controls on control rod removal and hardwire interlock to block an additional control rod withdrawal.	Rev. 0
3.10.5	3.10.5.1	The 24 hour Frequency is acceptable, given the administrative controls on fuel assembly and control rod removal, and takes into account other indications of control rod status available in the control room.	Rev. 0
3.10.5	3.10.5.2	The 24 hour Frequency is acceptable, given the administrative controls on fuel assembly and control rod removal, and takes into account other indications of control rod status available in the control room.	Rev. 0
3.10.5	3.10.5.3	The 24 hour Frequency is acceptable, given the administrative controls on fuel assembly and control rod removal, and takes into account other indications of control rod status available in the control room.	Rev. 0
3.10.7	3.10.7.4	The 12 hour Frequency is intended to provide appropriate assurance that each operating shift is aware of and verifies compliance with these Special Operations LCO requirements.	Rev. 0
3.10.7	3.10.7.6	The 7 day Frequency has been shown to be acceptable through operating experience and takes into account indications available in the control room.	Rev. 0

TABLE 2

Surveillance Requirement Bases

Table 2 Notes:

(a) Surveillance frequencies beyond Revision 0 have been evaluated in accordance with Technical Specifications Section 5.5.14, “Surveillance Frequency Control Program.” Surveillance frequencies at Revision 0 reflect the licensing basis prior to SFCP implementation.

Table 2 References:

1. NEDC-30851-P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System," March 1988.
2. CENPD-400-P, Rev. 01, "Generic Topical Report for the ABB Option III Oscillation Power Range Monitor (OPRM)," May 1995.
3. NEDC-30851-P-A, Supplement 1, "Technical Specification Improvement Analysis for BWR Control Rod Block Instrumentation," October 1988.
4. GENE-770-06-1-A, "Bases for Changes to Surveillance Test Intervals and Allowed Out-of-Service Times For Selected Instrumentation Technical Specifications," December 1992.
5. NEDC-30936-P-A, "BWR Owners' Group Technical Specification Improvement Analyses for ECCS Actuation Instrumentation, Part 1 and Part 2," December 1988.
6. NEDC-31677P-A, "Technical Specification Improvement Analysis for BWR Isolation Actuation Instrumentation," July 1990.
7. NEDC-30851P-A Supplement 2, "Technical Specifications Improvement Analysis for BWR Isolation Instrumentation Common to RPS and ECCS Instrumentation," March 1989.
8. NRC Generic Letter 91-09, "Modification of Surveillance Interval for the Electrical Protective Assemblies in Power Supplies for the Reactor Protection System."
9. ASME Code for Operation and Maintenance of Nuclear Power Plants.
10. Generic Letter 88-01, Supplement 1, February 1992.
11. NEDO-32977-A, "Excess Flow Check Valve Testing Relaxation," June 2000.
12. NRC Regulatory Guide 1.9, Revision 3, July 1993.
13. NRC Regulatory Guide 1.137, Revision 1, October 1979.
14. NRC Generic Letter 84-15, July 2, 1984.
15. IEEE Standard 450, 1987.
16. IEEE Standard 450, 1995.

B 3.0 TECHNICAL REQUIREMENTS MANUAL LIMITING CONDITION FOR OPERATION (TLCO) APPLICABILITY

BASES

TLCOs

TLCO 3.0.a through TLCO 3.0.f establish the general requirements applicable to all TLCOs in Sections 2.1 and 3.1 through 3.9 and apply at all times, unless otherwise stated.

TLCO 3.0.a

TLCO 3.0.a establishes the Applicability statement within each individual TLCO as the requirement for when the TLCO is required to be met (i.e., when the unit is in the MODES or other specified conditions of the Applicability statement of each Requirement).

TLCO 3.0.b

TLCO 3.0.b establishes that upon discovery of a failure to meet a TLCO, the associated ACTIONS shall be met. The Completion Time of each Required Action for an ACTIONS Condition is applicable from the point in time that an ACTIONS Condition is entered. The Required Actions establish those remedial measures that must be taken within specified Completion Times when the requirements of a TLCO are not met. This Requirement establishes that:

a. Completion of the Required Actions within the specified Completion Times constitutes compliance with a TLCO; and

b. Completion of the Required Actions is not required when a TLCO is met within the specified Completion Time, unless otherwise specified.

There are two basic types of Required Actions. The first type of Required Action specifies a time limit in which the TLCO must be met. This time limit is the Completion Time to restore an inoperable system or component to OPERABLE status or to restore variables to within specified limits. If this type of Required Action is not completed within the specified Completion Time, a shutdown may be required to place the unit in a MODE or condition in which the TLCO is not applicable. (Whether stated as a Required Action or not, correction of the entered Condition is an action that may always be considered upon entering ACTIONS.) The second type of

(continued)

BASES (continued)

TLCO 3.0.b (continued)

Required Action specifies the remedial measures that permit continued operation of the unit that is not further restricted by the Completion Time. In this case, compliance with the Required Actions provides an acceptable level of safety for continued operation.

Completing the Required Actions is not required when a TLCO is met or is no longer applicable, unless otherwise stated in the individual TLCOs.

The nature of some Required Actions of some Conditions necessitates that, once the Condition is entered, the Required Actions must be completed even though the associated Condition no longer exists. The individual TLCO's ACTIONS specify the Required Actions where this is the case. An example of this is in TLCO 3.7.i, "Snubbers."

The Completion Times of the Required Actions are also applicable when a system or component is removed from service intentionally. The reasons for intentionally relying on the ACTIONS include, but are not limited to, performance of Surveillances, preventive maintenance, corrective maintenance, or investigation of operational problems. Entering ACTIONS for these reasons must be done in a manner that does not compromise safety. Intentional entry into ACTIONS should not be made for operational convenience. Additionally, if intentional entry into ACTIONS would result in redundant equipment being inoperable, alternatives should be used instead. Doing so limits the time both subsystems/divisions of a safety function are inoperable and limits the time conditions exist which may result in TLCO 3.0.c being entered. Individual TLCOs may specify a time limit for performing a TSR when equipment is removed from service or bypassed for testing. In this case, the Completion Times of the Required Actions are applicable when this time limit expires, if the equipment remains removed from service or bypassed.

When a change in MODE or other specified condition is required to comply with Required Actions, the unit may enter a MODE or other specified condition in which another TLCO becomes applicable. In this case, the Completion Times of the associated Required Actions would apply from the point in time that the new TLCO becomes applicable and the ACTIONS Condition(s) are entered.

(continued)

BASES (continued)

TLCO 3.0.c

TLCO 3.0.c establishes the actions that must be implemented when a TLCO is not met and:

a. An associated Required Action and Completion Time is not met and no other Condition applies; or

b. The condition of the unit is not specifically addressed by the associated ACTIONS. This means that no combination of Conditions stated in the ACTIONS can be made that exactly corresponds to the actual condition of the unit. Sometimes, possible combinations of Conditions are such that entering TLCO 3.0.c is warranted; in such cases, the ACTIONS specifically state a Condition corresponding to such combinations and also that TLCO 3.0.c be entered immediately.

Upon entering TLCO 3.0.c, 1 hour is allowed to implement appropriate compensatory actions and verify the plant is not in an unanalyzed condition or that a required safety function is not compromised. Within 12 hours, Shift Operations Superintendent or designee approval of the compensatory actions and the plan for exiting TLCO 3.0.c must be obtained. The use and interpretation of specified times to complete the actions of TLCO 3.0.c are consistent with the discussion of Section 1.3, Completion Times.

The actions required in accordance with TLCO 3.0.c may be terminated and TLCO 3.0.c exited if any of the following occurs:

a. The TLCO is now met.

b. A Condition exists for which the Required Actions have now been performed.

c. ACTIONS exist that do not have expired Completion Times. These Completion Times are applicable from the point in time that the Condition is initially entered and not from the time TLCO 3.0.c is exited.

(continued)

BASES (continued)

TLCO 3.0.c (continued)

In MODES 1, 2, and 3, TLCO 3.0.c provides actions for Conditions not covered in other Requirements. The requirements of TLCO 3.0.c do not apply in MODES 4 and 5 because the unit is already in the most restrictive Condition. The requirements of TLCO 3.0.c do not apply in other specified conditions of the Applicability (unless in MODE 1, 2, or 3) because the ACTIONS of individual TLCOs sufficiently define the remedial measures to be taken.

TLCO 3.0.d

TLCO 3.0.d establishes limitations on changes in MODES or other specified conditions in the Applicability when an TLCO is not met. It allows placing the unit in a MODE or other specified condition stated in that Applicability (e.g., the Applicability desired to be entered) when unit conditions are such that the requirements of the TLCO would not be met, in accordance with TLCO 3.0.d.1, TLCO 3.0.d.2, or TLCO 3.0.d.3.

TLCO 3.0.d.1 allows entry into a MODE or other specified condition in the Applicability with the TLCO not met when the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time. Compliance with Required Actions that permit continued operation of the unit for an unlimited period of time in a MODE or other specified condition provides an acceptable level of safety for continued operation. This is without regard to the status of the unit before or after the MODE change. Therefore, in such cases, entry into a MODE or other specified condition in the Applicability may be made in accordance with the provisions of the Required Actions.

TLCO 3.0.d.2 allows entry into a MODE or other specified condition in the Applicability with the TLCO not met after performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the MODE or other specified condition in the Applicability, and establishment of risk management actions, if appropriate.

The risk assessment may use quantitative, qualitative, or blended approaches, and the risk assessment will be conducted using the plant program, procedures, and criteria in place to implement 10 CFR 50.65(a)(4), which requires that risk impacts of maintenance activities be assessed and managed. The risk assessment, for the purposes of TLCO 3.0.d.2, must take into account all inoperable TRM equipment regardless of whether the equipment is included in the normal 10 CFR 50.65(a)(4) risk assessment scope.

(continued)

TLCO 3.0.d (continued)

The risk assessments will be conducted using the procedures and guidance endorsed by Regulatory Guide 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants." Regulatory Guide 1 .182 endorses the guidance in Section 11 of NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants ." These documents address general guidance for conduct of the risk assessment, quantitative and qualitative guidelines for establishing risk management actions, and example risk management actions. These include actions to plan and conduct other activities in a manner that controls overall risk, increased risk awareness by shift and management personnel, actions to reduce the duration of the condition, actions to minimize the magnitude of risk increases (establishment of backup success paths or compensatory measures), and determination that the proposed MODE change is acceptable. Consideration should also be given to the probability of completing restoration such that the requirements of the TLCO would be met prior to the expiration of ACTIONS Completion Times that would require exiting the Applicability.

TLCO 3.0.d.2 may be used with single, or multiple systems and components unavailable. NUMARC 93-01 provides guidance relative to consideration of simultaneous unavailability of multiple systems and components.

The results of the risk assessment shall be considered in determining the acceptability of entering the MODE or other specified condition in the Applicability, and any corresponding risk management actions. The TLCO 3.0.d.2 risk assessments do not have to be documented.

The TRM allows continued operation with equipment unavailable in MODE 1 for the duration of the Completion Time. Since this is allowable, and since in general the risk impact in that particular MODE bounds the risk of transitioning into and through the applicable MODES or other specified conditions in the Applicability of the TLCO, the use of the TLCO 3.0.d.2 allowance should be generally acceptable, as long as the risk is assessed and managed as stated above.

The provisions of this TLCO should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.

The provisions of TLCO 3.0.d shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of TLCO 3.0.d shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown. In this context, a unit shutdown is

(continued)

BASES (continued)

TLCO 3.0.d (continued)	defined as a change in MODE or other specified condition in the Applicability associated with transitioning from MODE 1 to MODE 2, MODE 2 to MODE 3, and MODE 3 to MODE 4. Upon entry into a MODE or other specified condition in the Applicability with the TLCO not met, TLCO 3.0.a and TLCO 3.0.b require entry into the applicable Conditions and Required Actions until the Condition is resolved, until the TLCO is met, or until the unit is not within the Applicability of the TLCO. TSRs do not have to be performed on the associated inoperable equipment (or on variables outside the specified limits), as permitted by TSR 3.0.a. Therefore, utilizing TLCO 3.0.d is not a violation of TSR 3.0.a or TSR 3.0.d for any TSRs that have not been performed on inoperable equipment. However, TSRs must be met to ensure OPERABILITY prior to declaring the associated equipment OPERABLE (or variable within limits) and restoring compliance with the affected TLCO.
TLCO 3.0.e	TLCO 3.0.e establishes the allowance for restoring equipment to service under administrative controls when it has been removed from service or declared inoperable to comply with ACTIONS. The sole purpose of this Requirement is to provide an exception to TLCO 3.0.b (e.g., to not comply with the applicable Required Action(s)) to allow the performance of required testing to demonstrate: a. The OPERABILITY of the equipment being returned to service; or b. The OPERABILITY of other equipment. The administrative controls ensure the time the equipment is returned to service in conflict with the requirements of the ACTIONS is limited to the time absolutely necessary to perform the required testing to demonstrate OPERABILITY. This Requirement does not provide time to perform any other preventive or corrective maintenance. An example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to prevent the trip function from occurring during the performance of required testing on another channel in the other trip system. A similar example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to permit the logic to function and indicate the appropriate response during the performance of required testing on another channel in the same trip system.

BASES (continued)

TLCO 3.0.f	TLCO 3.0.f establishes the applicability of each TLCO to both Unit 1 and Unit 2 operation. Whenever a requirement applies to only one unit, or is different for each unit, this will be identified in the appropriate section of the TLCO (e.g., Applicability, TSR, etc.) with parenthetical reference, Notes, or other appropriate presentation within the body of the requirement.

B 3.0 TECHNICAL REQUIREMENTS MANUAL SURVEILLANCE REQUIREMENT (TSR) APPLICABILITY

BASES

TSRs

TSR 3.0.a through TSR 3.0.e establish the general requirements applicable to all Requirements in Sections 2.1 and 3.1 through 3.9 and apply at all times, unless otherwise stated.

TSR 3.0.a

TSR 3.0.a establishes the requirement that TSRs must be met during the MODES or other specified conditions in the Applicability for which the requirements of the TLCO apply, unless otherwise specified in the individual TSRs. This TLCO is to ensure that TSRs are performed to verify the OPERABILITY of systems and components, and that variables are within specified limits. Failure to meet a TSR within the specified Frequency, in accordance with TSR 3.0.b, constitutes a failure to meet a TLCO.

Systems and components are assumed to be OPERABLE when the associated TSRs have been met. Nothing in this TSR, however, is to be construed as implying that systems or components are OPERABLE when:

a. The systems or components are known to be inoperable, although still meeting the TSRs; or

b. The requirements of the TSR(s) are known to be not met between required TSR performances.

TSR do not have to be performed when the unit is in a MODE or other specified condition for which the requirements of the associated TLCO are not applicable, unless otherwise specified.

Unplanned events may satisfy the requirements (including applicable acceptance criteria) for a given TSR. In this case, the unplanned event may be credited as fulfilling the performance of the TSR.

(continued)

BASES (continued)

TSR 3.0.a (continued)

TSRs, including TSRs invoked by Required Actions, do not have to be performed on inoperable equipment because the ACTIONS define the remedial measures that apply. TSRs have to be met and performed in accordance with TSR 3.0.b, prior to returning equipment to OPERABLE status.

Upon completion of maintenance, appropriate post maintenance testing is required to declare equipment OPERABLE. This includes ensuring applicable TSRs are not failed and their most recent performance is in accordance with TSR 3.0.b. Post maintenance testing may not be possible in the current MODE or other specified conditions in the Applicability due to the necessary unit parameters not having been established. In these situations, the equipment may be considered OPERABLE provided testing has been satisfactorily completed to the extent possible and the equipment is not otherwise believed to be incapable of performing its function. This will allow operation to proceed to a MODE or other specified condition where other necessary post maintenance tests can be completed.

TSR 3.0.b

TSR 3.0.b establishes the requirements for meeting the specified Frequency for TSRs and any Required Action with a Completion Time that requires the periodic performance of the Required Action on a "once per..." interval.

TSR 3.0.b permits a 25% extension of the interval specified in the Frequency. This extension facilitates TSR scheduling and considers plant operating conditions that may not be suitable for conducting the TSR (e.g., transient conditions or other ongoing TSR or maintenance activities).

The 25% extension does not significantly degrade the reliability that results from performing the TSR at its specified Frequency. This is based on the recognition that the most probable result of any particular TSR being performed is the verification of conformance with the TSRs.

As stated in TSR 3.0.b, the 25% extension also does not apply to the initial portion of a periodic Completion Time that requires performance on a "once per..." basis. The 25% extension applies to each performance after the initial performance. The initial performance of the Required

(continued)

BASES (continued)

TSR 3.0.b (continued)	Action, whether it is a particular TSR or some other remedial action, is considered a single action with a single Completion Time. One reason for not allowing the 25% extension to this Completion Time is that such an action usually verifies that no loss of function has occurred by checking the status of redundant or diverse components or accomplishes the function of the inoperable equipment in an alternative manner. The provisions of TSR 3.0.b are not intended to be used repeatedly merely as an operational convenience to extend TSR intervals (other than those consistent with refueling intervals) or periodic Completion Time intervals beyond those specified.
TSR 3.0.c	TSR 3.0.c establishes the flexibility to defer declaring affected equipment inoperable or an affected variable outside the specified limits when a TSR has not been completed within the specified Frequency. A delay period of up to 24 hours or up to the limit of the specified Frequency, whichever is greater, applies from the point in time it is discovered that the TSR has not been performed in accordance with TSR 3.0.b, and not at the time that the specified Frequency was not met. This delay period provides adequate time to complete TSRs that have been missed. This delay period permits the completion of a TSR before complying with Required Actions or other remedial measures that might preclude completion of the TSR. The basis for this delay period includes consideration of unit conditions, adequate planning, availability of personnel, the time required to perform the TSR, the safety significance of the delay in completing the required TSR, and the recognition that the most probable result of any particular TSR being performed is the verification of conformance with the requirements. When a TSR with a Frequency based not on time intervals, but upon specified unit conditions, operating situations, or requirements of regulations (e.g., prior to start of movement of fuel assemblies or control rods, or in accordance with the Diesel Fuel Oil Testing Program, etc.) is discovered to not have been performed when specified, TSR 3.0.c allows for

(continued)

BASES (continued)

TSR 3.0.c (continued)

the full delay period of up to the specified Frequency to perform the TSR. However, since there is not a time interval specified, the missed TSR should be performed at the first reasonable opportunity.

TSR 3.0.c provides a time limit for, and allowances for the performance of, TSRs that become applicable as a consequence of MODE changes imposed by Required Actions.

Failure to comply with specified Frequencies for TSRs is expected to be an infrequent occurrence. Use of the delay period established by TSR 3.0.c is a flexibility which is not intended to be used as an operational convenience to extend TSR intervals. While up to 24 hours or the limit of the specified Frequency is provided to perform the missed TSR, it is expected that the missed TSR will be performed at the first reasonable opportunity. The determination of the first reasonable opportunity should include consideration of the impact on plant risk (from delaying the TSR as well as any plant configuration changes required or shutting the plant down to perform the TSR) and impact on any analysis assumptions, in addition to unit conditions, planning, availability of personnel, and the time required to perform the TSR. This risk impact should be managed through the program in place to implement 10 CFR 50.65(a)(4) and its implementation guidance, NRC Regulatory Guide 1.182, “Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants.” This Regulatory Guide addresses consideration of temporary and aggregate risk impacts, determination of risk management action thresholds, and risk management action up to and including plant shutdown. The missed TSR should be treated as an emergent condition as discussed in the Regulatory Guide. The risk evaluation may use quantitative, qualitative, or blended methods. The degree of depth and rigor of the evaluation should be commensurate with the importance of the component. Missed TSRs for important components should be analyzed quantitatively. If the results of the risk evaluation determine the risk increase is significant, this evaluation should be used to determine the safest course of action. All missed TSRs will be placed in the station’s Corrective Action Program.

(continued)

BASES (continued)

TSR 3.0.c (continued)	If a TSR is not completed within the allowed delay period, then the equipment is considered inoperable or the variable then is considered outside the specified limits and the Completion Times of the Required Actions for the applicable TLCO Conditions begin immediately upon expiration of the delay period. If a TSR is failed within the delay period, then the equipment is inoperable, or the variable is outside the specified limits and the Completion Times of the Required Actions for the applicable TLCO Conditions begin immediately upon the failure of the TSR. Completion of the TSR within the delay period allowed by this TSR, or within the Completion Time of the ACTIONS, restores compliance with TSR 3.0.a.
TSR 3.0.d	TSR 3.0.d establishes the requirement that all applicable TSRs must be met before entry into a MODE or other specified condition in the Applicability. This TSR ensures that system and component OPERABILITY requirements and variable limits are met before entry into MODES or other specified conditions in the Applicability for which these systems and components ensure safe operation of the unit. The provisions of this TSR should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability. A provision is included to allow entry into a MODE or other specified condition in the Applicability when an TLCO is not met due to a TSR not being met in accordance with TLCO 3.0.d. However, in certain circumstances, failing to meet an TSR will not result in TSR 3.0.d restricting a MODE change or other specified condition change. When a system, subsystem, division, component, device, or variable is inoperable or outside its specified limits, the associated TSR(s) are not required to be performed, per TSR 3.0.a, which states that TSRs do not have to be performed on inoperable equipment. When equipment is inoperable, TSR 3.0.d does not apply to the associated TSR(s) since the requirement for the TSR(s) to be performed is removed. Therefore, failing to perform the TSR(s) within the specified Frequency does not result in an TSR 3.0.d restriction to changing MODES or other specified conditions of the Applicability.

(continued)

BASES (continued)

TSR 3.0.d (continued)	However, since the TLCO is not met in this instance, TLCO 3.0.d will govern any restrictions that may (or may not) apply to MODE or other specified condition changes. TSR 3.0.d does not restrict changing MODES or other specified conditions of the Applicability when a TSR has not been performed within the specified Frequency, provided the requirement to declare the TLCO not met has been delayed in accordance with TSR 3.0.c. The provisions of TSR 3.0.d shall not prevent entry into MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of TSR 3.0.d shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown. In this context, a unit shutdown is defined as a change in MODE or other specified condition in the Applicability associated with transitioning from MODE 1 to MODE 2, MODE 2 to MODE 3, and MODE 3 to MODE 4. The precise requirements for performance of TSRs are specified such that exceptions to TSR 3.0.d are not necessary. The specific time frames and conditions necessary for meeting the TSRs are specified in the Frequency, in the TSR, or both. This allows performance of TSRs when the prerequisite condition(s) specified in a surveillance procedure require entry into the MODE or other specified condition in the Applicability of the associated TLCO prior to the performance or completion of a TSR. A TSR that could not be performed until after entering the TLCO's Applicability, would have its Frequency specified such that it is not "due" until the specific conditions needed are met. Alternately, the TSR may be stated in the form of a Note, as not required (to be met or performed) until a particular event, condition, or time has been reached. Further discussion of the specific formats of TSRs' annotation is found in TRM Section 1.4, Frequency.
TSR 3.0.e	TSR 3.0.e establishes the applicability of each TSR to both Unit 1 and Unit 2 operation. Whenever a requirement applies to only one unit, or is different for each unit, this will be identified with parenthetical reference, Notes, or other appropriate presentation within the TSR.

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Technical Requirements Manual Section B 3.1 Not Used

B 3.3 INSTRUMENTATION

B 3.3.a Control Rod Block Instrumentation

BASES

The control rod block functions are provided to prevent excessive control rod withdrawal. During shutdown conditions, control rod block instrumentation initiates withdrawal blocks to ensure that all control rods remain inserted to prevent inadvertent criticality. In MODE 5, control rods withdrawn from a core cell containing no fuel assemblies do not affect the reactivity of the core and, therefore, are not required to have Source Range Monitor (SRM)/Intermediate Range Monitor (IRM) rod block capability.

The trip logic for the control rod block functions is one-out-of-n; e.g., any trip of one of the six average power range monitors (APRMs), eight intermediate range monitors (IRMs), or four source range monitors (SRMs), will result in a rod block. The minimum instrument CHANNEL requirements assure sufficient instrumentation to assure that the single failure criterion is met.

The APRM rod block function is flow-biased and prevents a significant reduction in MCPR, especially during operation at reduced flow. The APRM rod block function is flow dependent until it reaches the applicable setting where it is "clamped" at its maximum allowed value. The APRM provides gross core protection, i.e., limits the gross withdrawal of control rods in the normal withdrawal sequence. In the MODE 5 and MODE 2, the APRM rod block function setpoint is significantly reduced to provide the same type of protection in MODE 5 and MODE 2 as the APRM flow-biased rod block does in MODE 1, i.e., prevents control rod withdrawal before a scram is reached.

The APRM Flow Biased Neutron Flux—High Control Rod Block Function is varied as a function of recirculation loop flow (W) up to its clamped value. "W" is equal to the percentage of the drive flow required to produce a rated core flow of 98 x 10^6 lbs/hr.

The IRM rod block function provides local as well as gross core protection. The scaling arrangement is such that the trip setting is less than a factor of ten above the indicated level. Analysis of the worst-case accident results in rod block action before MCPR approaches the MCPR fuel cladding integrity Safety Limit.

A downscale indication on an APRM is an indication that the instrument has failed or is not sufficiently sensitive. In either case, the instrument will not respond to changes in control rod motion, and the control rod motion is thus prevented.

The SRM rod blocks of low count rate and the detector not fully inserted assure that the SRMs are not withdrawn from the core prior to commencing rod withdrawal for startup. The scram discharge volume, high water level rod block provides annunciation for operator action. The alarm setpoint has been selected to provide adequate time to allow for the determination of the cause for the level increase and corrective action prior to automatic scram initiation.

B 3.3 INSTRUMENTATION

B 3.3.b Post Accident Monitoring (PAM) Instrumentation

BASES

Instrumentation is provided to monitor sufficient accident conditions to adequately assess important variables and provide the operators with the necessary information to complete the appropriate mitigation actions. OPERABILITY of the instrumentation listed provides adequate monitoring of the containment following a loss-of-coolant accident. Information from this instrumentation will provide the operator with a detailed knowledge of the conditions resulting from the accident; based on this information, the operator can make logical decisions regarding post accident recovery. Allowable outage times are based on diverse instrumentation availability for guiding the operator should an accident occur, and on the low probability of an instrument being out-of-service concurrent with an accident.

In Reference 1 Exelon submitted a License Amendment Request (LAR) removing the Drywell H_2/O_2 Post Accident Monitoring (PAM) instruments from the Technical Specifications. The NRC approved this request in Reference 2. The LAR contained a regulatory commitment (AT 346390-04) to maintain the capability of the drywell H_2 and O_2 concentration analyzers. The surveillance requirements provided in TRM section 3.3.b for Functions 5 and 6 are required to satisfy this regulatory commitment.

REFERENCES:

1. Letter from K. R. Jury (Exelon) to U. S. NRC, “Request for Amendment to Technical Specifications to Eliminate Requirements for Hydrogen Recombiners and Hydrogen/Oxygen Monitors Using the Consolidated Line Item Improvement Process,” dated September 15, 2004.
2. Letter from G. F. Dick (USNRC) to C. M. Crane, “Quad Cities Nuclear Power Station, Units 1 and 2 – Issuance of Amendments,” dated June 14, 2005.

B 3.3 INSTRUMENTATION

B 3.3.c Explosive Gas Monitoring Instrumentation

BASES

This instrumentation provides for monitoring the concentrations of potentially explosive gas mixtures in the Offgas Holdup System.

B 3.3 INSTRUMENTATION

B 3.3.d Suppression Chamber and Drywell Spray Actuation Instrumentation

BASES

Instrumentation is provided to monitor the parameters which are necessary to permit initiation of the suppression chamber and drywell spray mode of the low pressure coolant injection/containment cooling system to condense steam in the containment atmosphere. The spray mode does not significantly affect the rise of drywell pressure following a loss of coolant accident, but does result in quicker depressurization following completion of the blowdown.

B 3.3 INSTRUMENTATION

B 3.3.e Toxic Gas Monitoring System

BASES

Toxic gas monitoring instrumentation is provided in or near the Control Room Emergency Ventilation System intakes to allow prompt detection and the necessary protective actions to be initiated. Isolation from high toxic chemical concentration has been added to the station design as a result of the "Control Room Habitability Study" submitted to the NRC in December 1981 in response to NUREG-0737 Item III D.3.4. As explained in Section 3 of this study, ammonia, chlorine, and sulfur dioxide detection capability has been provided. In a report generated by Sargent and Lundy in April 1991, justification was provided to delete the chlorine and sulfur dioxide detectors from the plant. The setpoints chosen for the control room ventilation isolation are based on early detection in the outside air supply at the odor threshold, so that the toxic chemical will not achieve toxicity limit concentrations in the Control Room. To maximize system reliability, a limit of 30 days is provided for operation with a single sensor channel inoperable.

B 3.3 INSTRUMENTATION

B 3.3.f Reactor Water Cleanup (RWCU) Area Temperature Monitoring

BASES

ComEd engineering has recently evaluated the effects of a RWCU system break outside of the containment with a break small enough such that the feedwater system can maintain reactor water level above +8 inches. This analysis was necessary since Monticello reported that below 87 % power, more mass would be discharged to their secondary containment than in the main steam line break outside the containment; previously thought to be the most limiting break. Results of the evaluation show that more mass would be discharged to the secondary containment boundary during the postulated break and the reactor building blowout panels will blow, however, the equipment needed for safe shutdown can perform their function and dose to the public will remain below 10 CFR 100 limits. Crucial to mitigating this scenario is that prompt action is taken when the RWCU Area Temperature annunciators are in the alarm state. This TRM section provides greater control of the RWCU Temperature Area Monitors so that a high level of operability is maintained to support the prompt action required by the operators.

A modification has been installed which results in a RWCU System Isolation when high area temperature is detected. This system monitors 5 areas around the RWCU System Piping and also receives input from the Main Steam Tunnel area temperature monitors.

B 3.4 REACTOR COOLANT SYSTEM

B 3.4.a Structural Integrity

BASES

The inspection programs for ASME Code Class 1, 2, and 3 components ensure that the structural integrity of these components will be maintained at an acceptable level throughout the life of the plant.

The inservice inspection and testing program for ASME Code Class 1, 2, and 3 components will be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable addenda as required by 10 CFR 50.55a(g) except where specific written relief has been granted by the NRC pursuant to 10 CFR 50.55a(g)(6)(i).

B 3.4 REACTOR COOLANT SYSTEM

B 3.4.b Reactor Coolant System (RCS) Chemistry

BASES

The water chemistry limits of the reactor coolant system are established to prevent damage to the reactor materials in contact with the coolant. Chloride limits are specified to prevent stress corrosion cracking of the stainless steel. The effect of chloride is not as great when the oxygen concentration in the coolant is low, thus the higher limit on chlorides is permitted during MODE 1.

Conductivity measurements are required on a continuous basis since changes in this parameter are an indication of abnormal conditions. Without significant damage to stress corrosion cracking of reactor materials in contact with reactor coolant during classic NobleChem™, also referred to in the industry as Noble Metal Chemical Application (NMCA), the higher conductivity limits are permitted for a maximum of 48 hours for the injection of noble metal chemicals in MODE 3 and for a maximum of 24 hours after the end of the injection with the plant being in MODE 4 as rapidly as the cooldown rate limits permit after the end of the injection.

GE-Hitachi has developed and put into practice a second-generation NobleChem™ process to inject a platinum solution into the reactor during plant operation (Mode 1). The newer process is referred to as On-Line NobleChem™ (OLNC). The conditional requirements in TRM 3.4.b do not apply to the OLNC process.

When the conductivity is within limits, chlorides and other impurities affecting conductivity must also be within their acceptable limits. With the conductivity meter inoperable, additional samples must be analyzed to ensure that the chlorides are not exceeding the limits.

The surveillance requirements provide adequate assurance that concentrations in excess of the limits will be detected in sufficient time to take corrective action.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.a Residual Heat Removal (RHR) Drywell Spray

BASES

Each of the two RHR drywell spray subsystems contain one OPERABLE RHR pump and an OPERABLE flow path capable of recirculating water from the RHR suppression pool through a heat exchanger and the RHR drywell spray nozzles.

Periodic operation of the RHR drywell sprays may be used following a Design Basis Accident to assist the natural convection and diffusion mixing of hydrogen and oxygen when other ECCS requirements are met and oxygen concentration exceeds 4%. Since the spray system is a function of the LPCI/containment cooling system, the loops will not be aligned for the spray function during normal operation, but all components required to operate for proper alignment must be OPERABLE.

B 3.7 PLANT SYSTEMS

B 3.7.a Residual Heat Removal Service Water (RHRSW) System — Shutdown

BASES

The RHRSW system consists of two RHRSW subsystems with 2 RHRSW pumps, a heat exchanger and a flow path capable of taking suction from the Ultimate Heat Sink. An operable RHRSW subsystem shall consist of one OPERABLE RHRSW pump for each required OPERABLE RHR pump and an OPERABLE flow path capable of taking suction from the Ultimate Heat Sink and transferring water through one RHR heat exchanger.

In MODES 4 and 5, the OPERABILITY requirements of the RHRSW System are determined by the systems it supports. Thus, the LCOs of the RHR Shutdown Cooling System (LCO 3.4.8, "Residual Heat Removal (RHR) Shutdown Cooling System — Cold Shutdown," LCO 3.9.8, "Residual Heat Removal (RHR) — High Water Level," and LCO 3.9.9, "Residual Heat Removal (RHR) — Low Water Level"), which require portions of the RHRSW System to be OPERABLE, will govern RHRSW System operation in MODES 4 and 5.

The Train B CREV refrigeration condensing unit, normally served by the Service Water System, can be provided with cooling water from either the Unit 1 or 2 Residual Heat Removal Service Water (RHRSW) System.

The RHRSW System, with the Ultimate Heat Sink, provides sufficient cooling capacity for continued operation of the Residual Heat Removal System and of other safety-related equipment (e.g., RHRSW vault coolers, the Control Room Emergency Ventilation System refrigeration units), during normal and accident conditions. The redundant cooling capacity of the system, assuming a single failure, is consistent with the assumptions used in the safety analysis to keep the accident conditions within acceptable limits. OPERABILITY of this system is also dependent upon special measures for protection from flooding in the condenser pit area.

Movement of a Spent Fuel Cask containing Spent Nuclear Fuel in a sealed Multi-Purpose Canister (MPC) and using a single failure-proof crane is not considered to be “movement of irradiated fuel assemblies in secondary containment.” For more information, see references UFSAR, Section 9.1.4.3.2 and NRC Safety Evaluation Report associated with the Holtec International HI-STORM 100 Storage System (Docket Number 72-1014, Certificate Number 1014, Amendment 2).

B 3.7 PLANT SYSTEMS

B 3.7.b Diesel Generator Cooling Water (DGCW) System — Shutdown

BASES

The Diesel Generator Cooling Water System, with the Ultimate Heat Sink, provides sufficient cooling capacity for continued operation of the diesel generators during normal and accident conditions. The cooling capacity of the system is consistent with the assumptions used in the safety analysis to keep the accident conditions within acceptable limits. OPERABILITY of this system is also dependent upon special measures for protection from flooding in the condenser pit area.

The diesel generator cooling water subsystem also provides cooling water to the Emergency Core Cooling System (ECCS) room emergency coolers. During normal lineup, the diesel generator cooling water subsystems are aligned such that the Unit 1 and Unit 2 subsystems provide cooling to the Unit 1 and Unit 2 ECCS emergency room coolers (respectively). Should one of the Unit diesel generator cooling water subsystems become inoperable, the common diesel generator (i.e., 1/2 diesel generator) cooling water subsystem can be aligned to either Unit's ECCS room emergency coolers. To meet the requirements of the TLCO, the DGCW pump must be capable of being aligned to supply cooling to the ECCS room emergency coolers.

Without DGCW supplied to the ECCS room emergency coolers, OPERABILITY of the associated ECCS equipment may be evaluated or it may be declared inoperable.

B 3.7 PLANT SYSTEMS

B 3.7.c Ultimate Heat Sink (UHS) — Shutdown

BASES

The Mississippi River provides an Ultimate Heat Sink with sufficient cooling capacity to either provide normal cooldown of the units, or to mitigate the effects of accident conditions within acceptable limits for one unit while conducting a normal cooldown on the other unit.

Movement of a Spent Fuel Cask containing Spent Nuclear Fuel in a sealed Multi-Purpose Canister (MPC) and using a single failure-proof crane is not considered to be “movement of irradiated fuel assemblies in secondary containment.” For more information, see references UFSAR, Section 9.1.4.3.2 and NRC Safety Evaluation Report associated with the Holtec International HI-STORM 100 Storage System (Docket Number 72-1014, Certificate Number 1014, Amendment 2).

B 3.7 PLANT SYSTEMS

B 3.7.d Liquid Holdup Tanks

BASES

Restricting the quantity of radioactive material contained in the specified tanks provides assurance that in the event of an uncontrolled release of the tanks' contents, the resulting concentrations would be less than the limits of 10 CFR Part 20, Appendix B, Table 2, Column 2, in an unrestricted area. Recirculation of the tank contents for the purpose of reducing the radioactive content is not considered to be an addition of radioactive material to the tank.

B 3.7 PLANT SYSTEMS

B 3.7.e Explosive Gas Mixture

BASES

The specification is provided to ensure that the concentration of potentially explosive gas mixtures contained in the waste gas holdup system is maintained below the flammability limits of hydrogen and oxygen. Maintaining the concentration of hydrogen and oxygen below their flammability limits provides assurance that the releases of radioactive materials will be controlled in conformance with the requirements of General Design Criterion 60 of Appendix A to 10 CFR Part 50.

B 3.7 PLANT SYSTEMS

B 3.7.f Flood Protection

BASES

Flood protection measures are provided to protect the systems and equipment necessary for safe shutdown during high water conditions. The equipment necessary to implement the appropriate measures, as detailed in plant procedures, is required to be available, but not necessarily onsite, to implement the procedures in a timely manner. The selected water levels are based on providing timely protection from the design basis flood of the river.

B 3.7 PLANT SYSTEMS

B 3.7.g Sealed Source Contamination

BASES

The limitations on removable contamination for sources requiring leak testing, including alpha emitters, is based on 10 CFR 70.39(c) limits for plutonium. This limitation will ensure that leakage from byproduct, source, and special nuclear material sources will not exceed allowable intake values. Sealed sources, including startup sources and fission detectors, are classified into three groups according to their use, with surveillance requirements commensurate with the probability of damage to a source in that group. Those sources which are frequently handled are required to be tested more often than those which are not. Sealed sources which are continuously enclosed within a shielded mechanism, i.e., sealed sources within radiation monitoring or boron measuring devices, are considered to be stored and need not be tested unless they are removed from the shielded mechanism.

B 3.7 PLANT SYSTEMS

B 3.7.h Snubbers

BASES

Snubbers are provided to ensure that the structural integrity of the reactor coolant system and all other safety-related systems is maintained during and following a seismic event or other events that initiate dynamic loads. To maintain a constant level of snubber protection to the systems, periodic visual inspection, functional testing and the service life monitoring of snubbers is performed in accordance with the 10CFR50.55a approved edition of the ASME OMa Code, Subsection ISTD as denoted in the current revision of the Inservice Inspection Plan.

B 3.9 REFUELING OPERATIONS

B 3.9.a Communications

BASES

The requirement for communications capability ensures that refueling station personnel can be promptly informed of significant or potential changes in the facility status or core reactivity during CORE ALTERATIONS.

Core Operating Limits Report

For

Quad Cities Unit 2 Cycle 25

Prepared By:	Ann Hopkins – Nuclear Fuels	Date: 2/27/2018
Reviewed By:	Kevin Egan – Reactor Engineering	Date: 2/27/18
Reviewed By:	Christopher Staum – Engineering Safety Analysis	Date: 2/27/18
Independent Review By:	Corie Glenn – Nuclear Fuels	Date: 2/27/18
Approved By:	Armando Johnson – NF Senior Manager	Date: 06MAR18
SQR By:	Kevin Egan – Station Qualified Reviewer	Date: 3/7/18

Table of Contents

Record of Quad Cities 2 Cycle 25 COLR Revisions

Revision	Description
12	Initial issuance for Q2C25

List of Tables

Page

1. Terms and Definitions

AOO	Anticipated operational occurrence
APLHGR	Average planar linear heat generation rate
ASD	Adjustable Speed Drive
CAVEX	Core average exposure
CPR	Critical power ratio
CRWE	Control rod withdrawal error
EFPD	Effective full power day
EFPH	Effective full power hour
EOC	End of cycle
EOCLB	End of cycle licensing basis
EOFPL	End of full power life
EOFPLB	End of full power licensing basis
EOOS	Equipment out of service
FHOOS	Feedwater heater out of service
FWT	Feedwater temperature
ICF	Increased core flow
ISS	Intermediate scram speed
LHGR	Linear heat generation rate
$LHGRFAC_f$	Flow dependent LHGR multiplier
$LHGRFAC_p$	Power dependent LHGR multiplier
LPRM	Local power range monitor
MAPLHGR	Maximum average planar linear heat generation rate
MCPR	Minimum critical power ratio
$MCPR_f$	Flow dependent MCPR
$MCPR_p$	Power dependent MCPR
MELLLA	Maximum extended load line limit analysis
MSIVOOS	Main steam isolation valve out of service
MWd/MTU	MegaWatt days per metric ton Uranium
NEOC	Near end of cycle
NRC	Nuclear Regulatory Commission
NSS	Nominal scram speed
OLMCPR	Operating limit minimum critical power ratio
OOS	Out of service
OPRM	Oscillation power range monitor
PBDA	Period based detection algorithm
PCOOS	Pressure controller out of service
PLUOOS	Power load unbalance out of service
SLMCPR	Safety limit minimum critical power ratio
SLO	Single loop operation
TBV	Turbine bypass valve
TBVOOS	Turbine bypass valves out of service
TCV	Turbine control valve
TIP	Traversing incore probe
TLO	Two loop operation
TMOL	Thermal mechanical operating limit
TRM	Technical Requirements Manual
TSSS	Technical Specification scram speed
TSV	Turbine stop valve

2. General Information

This report is prepared in accordance with Technical Specification 5.6.5. The Q2C25 reload is licensed by Framatome. Framatome is the same company as AREVA, and many legal documents still contain the name AREVA. However, some legacy analyses by Westinghouse are still applicable for OPTIMA2 fuel as described in Reference 2.

Licensed rated thermal power is 2957 MWth. Rated core flow is 98 Mlb/hr. Operation up to 108% rated core flow is licensed for this cycle. For allowed operating regions, see applicable power/flow map.

The licensing analysis supports full power operation to EOCLB (38,325 MWd/MTU CAVEX). Note that this value includes coastdown, where full power operation is not expected. The transient analysis limits are provided for operation up to specific CAVEX exposures as defined in Section 4.3.

Coastdown is defined as operation beyond EOFPL with the plant power gradually reducing as available core reactivity diminishes. The Q2C25 reload analyses do not credit this reduced power during coastdown and the EOCLB limits remain valid for operation up to rated power.

Power and flow dependent limits are listed for various power and flow levels. Linear interpolation on power and flow (as applicable) is to be used to find intermediate values. Linear interpolation is also to be used for table items intentionally left blank, as indicated by boxes which are grayed out.

$MCPR_p$ for both fuel types and $LHGRFAC_p$ for OPTIMA2 vary with scram speed. All other thermal limits are analyzed to remain valid with NSS, ISS, and TSSS.

$LHGRFAC_f$ is independent of feedwater temperature and EOOS conditions.

For thermal limit monitoring above 100% rated core flow, the 100% core flow values can be used unless otherwise indicated in the applicable table.

For thermal limit monitoring above 100% rated power or 108% rated core flow, the 100% rated power or the 108% core flow thermal limit values, respectively, shall be used. Steady state operation is not allowed in this region. Limits are provided for transient conditions only.

3. Average Planar Linear Heat Generation Rate

Technical Specifications Sections 3.2.1 and 3.4.1

Table 3-1 provides the MAPLHGR SLO multipliers for ATRIUM 10XM and OPTIMA2 fuel. For OPTIMA2 natural uranium lattices, TLO and SLO MAPLHGR values are provided in Table 3-2. The limits provided in Table 3-2 were selected to be the more limiting of the limits provided in References 5 and 7. For all other OPTIMA2 lattices, lattice-specific MAPLHGR values for TLO are provided in Tables 3-3 through 3-41.

For ATRIUM 10XM fuel, the MAPLHGR values can be found in Tables 3-42 through 3-44.

During SLO, the limits in Tables 3-3 through 3-44 are multiplied by the fuel-specific SLO multiplier listed in Table 3-1. The ATRIUM 10XM multiplier may be applied to OPTIMA2 for SLO conditions, as the ATRIUM 10XM multiplier is more limiting.

Table 3-1: MAPLHGR SLO Multipliers
(References 2, 5, and 7)

Fuel Type	Multiplier
ATRIUM 10XM	0.80
OPTIMA2	0.86

Table 3-2: MAPLHGR for OPTIMA2 Lattices 91 and 98
(References 5, 6, 7, and 8)

All OPTIMA2 Bundles Lattices 91: Opt2-B0.71 98: Opt2-T0.71	
Average Planar Exposure (MWd/MTU)	**TLO and SLO MAPLHGR (kW/ft)**
0	7.50
75000	7.50

Table 3-3: MAPLHGR for OPTIMA2 Lattice 152
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 152: Opt2-B4.26-14G7.50-4G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	8.89
2500	9.17
5000	9.26
7500	9.39
10000	9.72
12000	9.88
15000	9.93
17000	9.92
20000	9.95
22000	9.97
24000	9.98
30000	9.72
36000	9.59
42000	9.48
50000	9.40
60000	9.54
72000	9.81
75000	9.81

Table 3-4: MAPLHGR for OPTIMA2 Lattice 153
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 153: Opt2-B4.40-14G7.50-4G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	8.84
2500	9.13
5000	9.17
7500	9.25
10000	9.39
12000	9.46
15000	9.56
17000	9.62
20000	9.73
22000	9.69
24000	9.65
30000	9.60
36000	9.54
42000	9.51
50000	9.51
60000	9.60
72000	9.85
75000	9.85

Table 3-5: MAPLHGR for OPTIMA2 Lattice 154
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 154: Opt2-BE4.49-14G7.50-4G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.05
2500	9.40
5000	9.38
7500	9.34
10000	9.50
12000	9.57
15000	9.68
17000	9.74
20000	9.84
22000	9.80
24000	9.76
30000	9.69
36000	9.66
42000	9.58
50000	9.56
60000	9.60
72000	9.89
75000	9.89

Table 3-6: MAPLHGR for OPTIMA2 Lattice 155
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 155: Opt2-M4.49-14G7.50-4G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.02
2500	9.37
5000	9.41
7500	9.35
10000	9.52
12000	9.59
15000	9.69
17000	9.76
20000	9.84
22000	9.80
24000	9.75
30000	9.69
36000	9.65
42000	9.58
50000	9.51
60000	9.58
72000	9.90
75000	9.90

Table 3-7: MAPLHGR for OPTIMA2 Lattice 156
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 156: Opt2-ME4.45-14G7.50-4G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.16
2500	9.52
5000	9.52
7500	9.51
10000	9.68
12000	9.76
15000	9.88
17000	10.00
20000	9.98
22000	9.98
24000	9.93
30000	9.88
36000	9.83
42000	9.72
50000	9.64
60000	9.63
72000	10.16
75000	10.16

Table 3-8: MAPLHGR for OPTIMA2 Lattice 157
(References 7 and 8)

Bundle Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23) Lattice 157: Opt2-T4.45-18G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.28
2500	9.63
5000	9.46
7500	9.53
10000	9.66
12000	9.87
15000	10.18
17000	10.05
20000	9.99
22000	9.97
24000	9.93
30000	9.88
36000	9.79
42000	9.76
50000	9.65
60000	9.71
72000	10.20
75000	10.20

Table 3-9: MAPLHGR for OPTIMA2 Lattice 158
(References 7 and 8)

Bundle **Opt2-3.97-14GZ7.50/5.50-4GZ5.50 (UK23)** **Lattice** **158: Opt2-T4.47-14G5.50**	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.96
2500	10.26
5000	10.10
7500	10.01
10000	9.92
12000	10.01
15000	10.06
17000	10.03
20000	10.02
22000	10.01
24000	9.97
30000	9.93
36000	9.87
42000	9.76
50000	9.65
60000	9.70
72000	10.22
75000	10.22

Table 3-10: MAPLHGR for OPTIMA2 Lattice 159
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 159: Opt2-B4.30-14G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.42
2500	9.63
5000	9.70
7500	9.79
10000	9.87
12000	9.83
15000	9.88
17000	9.99
20000	10.11
22000	10.11
24000	10.13
30000	9.74
36000	9.61
42000	9.50
50000	9.41
60000	9.54
72000	9.81
75000	9.81

Table 3-11: MAPLHGR for OPTIMA2 Lattice 160
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 160: Opt2-B4.43-14G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.37
2500	9.62
5000	9.63
7500	9.69
10000	9.82
12000	9.73
15000	9.61
17000	9.59
20000	9.70
22000	9.72
24000	9.75
30000	9.70
36000	9.66
42000	9.61
50000	9.52
60000	9.62
72000	9.84
75000	9.84

Table 3-12: MAPLHGR for OPTIMA2 Lattice 161
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 161: Opt2-BE4.51-14G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.53
2500	9.76
5000	9.77
7500	9.73
10000	9.90
12000	9.77
15000	9.68
17000	9.69
20000	9.79
22000	9.84
24000	9.85
30000	9.81
36000	9.74
42000	9.65
50000	9.55
60000	9.62
72000	9.90
75000	9.90

Table 3-13: MAPLHGR for OPTIMA2 Lattice 162
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 162: Opt2-M4.51-14G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.47
2500	9.74
5000	9.77
7500	9.69
10000	9.89
12000	9.77
15000	9.68
17000	9.69
20000	9.80
22000	9.85
24000	9.85
30000	9.80
36000	9.73
42000	9.62
50000	9.51
60000	9.59
72000	9.90
75000	9.90

Table 3-14: MAPLHGR for OPTIMA2 Lattice 163
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 163: Opt2-ME4.47-14G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.66
2500	9.95
5000	9.94
7500	9.89
10000	10.06
12000	10.00
15000	9.89
17000	9.90
20000	10.05
22000	10.06
24000	10.08
30000	10.02
36000	9.93
42000	9.76
50000	9.59
60000	9.63
72000	10.16
75000	10.16

Table 3-15: MAPLHGR for OPTIMA2 Lattice 164
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 164: Opt2-T4.47-16G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.77
2500	10.09
5000	10.03
7500	10.00
10000	10.19
12000	10.13
15000	10.16
17000	10.15
20000	10.13
22000	10.14
24000	10.09
30000	10.04
36000	9.98
42000	9.82
50000	9.65
60000	9.71
72000	10.20
75000	10.20

Table 3-16: MAPLHGR for OPTIMA2 Lattice 165
(References 7 and 8)

Bundle Opt2-4.00-14GZ7.50/5.50-2GZ5.50 (UL23) Lattice 165: Opt2-T4.49-14G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.46
2500	9.77
5000	9.58
7500	9.60
10000	9.65
12000	9.71
15000	9.98
17000	10.13
20000	10.12
22000	10.13
24000	10.09
30000	10.04
36000	9.99
42000	9.78
50000	9.67
60000	9.70
72000	10.21
75000	10.21

Table 3-17: MAPLHGR for OPTIMA2 Lattice 166
(References 7 and 8)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UM23) Lattice 166: Opt2-B4.59-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.30
2500	9.48
5000	9.38
7500	9.34
10000	9.35
12000	9.37
15000	9.41
17000	9.45
20000	9.52
22000	9.58
24000	9.60
30000	9.63
36000	9.63
42000	9.62
50000	9.63
60000	9.67
72000	9.90
75000	9.90

Table 3-18: MAPLHGR for OPTIMA2 Lattice 167
(References 7 and 8)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UM23) Lattice 167: Opt2-BE4.67-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.35
2500	9.57
5000	9.42
7500	9.45
10000	9.56
12000	9.45
15000	9.51
17000	9.56
20000	9.63
22000	9.69
24000	9.71
30000	9.74
36000	9.78
42000	9.70
50000	9.68
60000	9.64
72000	9.94
75000	9.94

Table 3-19: MAPLHGR for OPTIMA2 Lattice 168
(References 7 and 8)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UM23) Lattice 168: Opt2-M4.67-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.34
2500	9.58
5000	9.40
7500	9.50
10000	9.58
12000	9.47
15000	9.51
17000	9.57
20000	9.70
22000	9.69
24000	9.72
30000	9.77
36000	9.79
42000	9.69
50000	9.65
60000	9.62
72000	9.95
75000	9.95

Table 3-20: MAPLHGR for OPTIMA2 Lattice 169
(References 7 and 8)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UM23) Lattice 169: Opt2-ME4.65-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.56
2500	9.79
5000	9.63
7500	9.66
10000	9.68
12000	9.65
15000	9.73
17000	9.82
20000	9.93
22000	9.98
24000	9.98
30000	10.00
36000	10.00
42000	9.94
50000	9.80
60000	9.77
72000	10.21
75000	10.21

Table 3-21: MAPLHGR for OPTIMA2 Lattice 170
(References 7 and 8)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UM23) **Lattice 170: Opt2-T4.64-10G6.00**	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	10.00
2500	10.18
5000	9.96
7500	10.04
10000	9.83
12000	9.81
15000	9.82
17000	9.85
20000	9.93
22000	9.98
24000	9.97
30000	10.00
36000	10.00
42000	9.94
50000	9.82
60000	9.77
72000	10.24
75000	10.24

Table 3-22: MAPLHGR for OPTIMA2 Lattice 171
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24) Lattice 171: Opt2-B4.30-16G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.15
2500	9.49
5000	9.44
7500	9.58
10000	9.81
12000	9.96
15000	10.19
17000	10.33
20000	10.54
22000	10.55
24000	10.56
30000	10.27
36000	10.14
42000	10.02
50000	9.92
75000	9.92

Table 3-23: MAPLHGR for OPTIMA2 Lattice 172
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24) Lattice 172: Opt2-B4.43-16G7.50-2G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.08
2500	9.43
5000	9.35
7500	9.31
10000	9.44
12000	9.53
15000	9.69
17000	9.77
20000	9.93
22000	10.06
24000	10.18
30000	10.15
36000	10.11
42000	10.06
50000	10.04
75000	10.04

Table 3-24: MAPLHGR for OPTIMA2 Lattice 173
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24) **Lattice 173: Opt2-BE4.52-16G7.50-2G5.50**	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.11
2500	9.43
5000	9.36
7500	9.34
10000	9.51
12000	9.61
15000	9.78
17000	9.87
20000	10.03
22000	10.19
24000	10.30
30000	10.24
36000	10.20
42000	10.13
50000	10.07
75000	10.07

Table 3-25: MAPLHGR for OPTIMA2 Lattice 174
(References 5 and 6)

Bundle **Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24)** **Lattice** **174: Opt2-M4.52-16G7.50-2G5.50**	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.09
2500	9.43
5000	9.34
7500	9.34
10000	9.52
12000	9.63
15000	9.79
17000	9.88
20000	10.05
22000	10.21
24000	10.29
30000	10.23
36000	10.19
42000	10.12
50000	10.03
75000	10.03

Table 3-26: MAPLHGR for OPTIMA2 Lattice 175
(References 5 and 6)

Bundle **Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24)** **Lattice** **175: Opt2-ME4.48-16G7.50-2G5.50**	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.22
2500	9.57
5000	9.47
7500	9.49
10000	9.66
12000	9.78
15000	9.95
17000	10.07
20000	10.39
22000	10.53
24000	10.48
30000	10.43
36000	10.37
42000	10.26
50000	10.13
75000	10.13

Table 3-27: MAPLHGR for OPTIMA2 Lattice 176
(References 5 and 6)

Bundle **Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24)** **Lattice** **176: Opt2-T4.48-16G7.50-2G5.50**	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.27
2500	9.60
5000	9.49
7500	9.47
10000	9.61
12000	9.76
15000	9.92
17000	10.06
20000	10.42
22000	10.50
24000	10.46
30000	10.42
36000	10.36
42000	10.22
50000	10.10
75000	10.10

Table 3-28: MAPLHGR for OPTIMA2 Lattice 177
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50-2G5.50 (UN24) Lattice 177: Opt2-T4.48-18G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.35
2500	9.70
5000	9.61
7500	9.58
10000	9.75
12000	9.96
15000	10.29
17000	10.50
20000	10.53
22000	10.51
24000	10.47
30000	10.42
36000	10.34
42000	10.31
50000	10.18
75000	10.18

Table 3-29: MAPLHGR for OPTIMA2 Lattice 178
(References 5 and 6)

Bundle **Opt2-4.00-16GZ7.50/5.50 (UO24)** **Lattice** **178: Opt2-B4.30-16G7.50**	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.44
2500	9.71
5000	9.58
7500	9.71
10000	9.88
12000	9.99
15000	10.21
17000	10.33
20000	10.48
22000	10.50
24000	10.52
30000	10.26
36000	10.12
42000	10.01
50000	9.92
75000	9.92

Table 3-30: MAPLHGR for OPTIMA2 Lattice 179
(References 5 and 6)

Bundle **Opt2-4.00-16GZ7.50/5.50 (UO24)** **Lattice** **179: Opt2-B4.43-16G7.50**	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.38
2500	9.62
5000	9.50
7500	9.44
10000	9.52
12000	9.57
15000	9.69
17000	9.77
20000	9.92
22000	10.05
24000	10.16
30000	10.13
36000	10.08
42000	10.04
50000	10.03
75000	10.03

Table 3-31: MAPLHGR for OPTIMA2 Lattice 180
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50 (UO24) Lattice 180: Opt2-BE4.53-16G7.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.42
2500	9.70
5000	9.56
7500	9.49
10000	9.60
12000	9.65
15000	9.79
17000	9.87
20000	10.02
22000	10.17
24000	10.28
30000	10.23
36000	10.19
42000	10.12
50000	10.06
75000	10.06

Table 3-32: MAPLHGR for OPTIMA2 Lattice 181
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50 (UO24) Lattice 181: Opt2-M4.53-16G7.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.40
2500	9.71
5000	9.59
7500	9.51
10000	9.62
12000	9.67
15000	9.80
17000	9.88
20000	10.04
22000	10.19
24000	10.28
30000	10.22
36000	10.19
42000	10.11
50000	10.03
75000	10.03

Table 3-33: MAPLHGR for OPTIMA2 Lattice 182
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50 (UO24) Lattice 182: Opt2-ME4.49-16G7.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.55
2500	9.86
5000	9.73
7500	9.66
10000	9.76
12000	9.82
15000	9.96
17000	10.06
20000	10.36
22000	10.51
24000	10.47
30000	10.42
36000	10.37
42000	10.25
50000	10.10
75000	10.10

Table 3-34: MAPLHGR for OPTIMA2 Lattice 183
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50 (UO24) Lattice 183: Opt2-T4.49-16G7.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.61
2500	9.89
5000	9.74
7500	9.65
10000	9.72
12000	9.81
15000	9.92
17000	10.05
20000	10.39
22000	10.47
24000	10.45
30000	10.42
36000	10.35
42000	10.21
50000	10.09
75000	10.09

Table 3-35: MAPLHGR for OPTIMA2 Lattice 184
(References 5 and 6)

Bundle Opt2-4.00-16GZ7.50/5.50 (UO24) Lattice 184: Opt2-T4.49-16G5.50	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.69
2500	10.00
5000	9.87
7500	9.76
10000	9.86
12000	10.01
15000	10.28
17000	10.48
20000	10.55
22000	10.54
24000	10.50
30000	10.45
36000	10.39
42000	10.31
50000	10.17
75000	10.17

Table 3-36: MAPLHGR for OPTIMA2 Lattice 185
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 185: Opt2-B4.59-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.71
2500	9.89
5000	9.80
7500	9.77
10000	9.77
12000	9.82
15000	9.87
17000	9.92
20000	10.00
22000	10.07
24000	10.09
30000	10.12
36000	10.12
42000	10.13
50000	10.12
75000	10.12

Table 3-37: MAPLHGR for OPTIMA2 Lattice 186
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 186: Opt2-BE4.67-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.75
2500	9.96
5000	9.82
7500	9.86
10000	9.99
12000	9.91
15000	9.96
17000	10.03
20000	10.11
22000	10.18
24000	10.20
30000	10.25
36000	10.27
42000	10.20
50000	10.15
75000	10.15

Table 3-38: MAPLHGR for OPTIMA2 Lattice 187
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 187: Opt2-M4.67-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.74
2500	9.97
5000	9.80
7500	9.89
10000	10.01
12000	9.92
15000	9.98
17000	10.04
20000	10.18
22000	10.18
24000	10.21
30000	10.26
36000	10.28
42000	10.20
50000	10.15
75000	10.15

Table 3-39: MAPLHGR for OPTIMA2 Lattice 188
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 188: Opt2-ME4.65-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	9.96
2500	10.19
5000	10.03
7500	10.06
10000	10.15
12000	10.10
15000	10.19
17000	10.29
20000	10.41
22000	10.47
24000	10.47
30000	10.50
36000	10.50
42000	10.44
50000	10.28
75000	10.28

Table 3-40: MAPLHGR for OPTIMA2 Lattice 189
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 189: Opt2-T4.65-12G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	10.02
2500	10.25
5000	10.09
7500	10.11
10000	10.09
12000	10.07
15000	10.18
17000	10.27
20000	10.43
22000	10.47
24000	10.48
30000	10.51
36000	10.49
42000	10.42
50000	10.24
75000	10.24

Table 3-41: MAPLHGR for OPTIMA2 Lattice 190
(References 5 and 6)

Bundle Opt2-4.17-2GZ6.00-10G6.00 (UP24) Lattice 190: Opt2-T4.64-10G6.00	
Avg. Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	10.42
2500	10.60
5000	10.39
7500	10.48
10000	10.30
12000	10.27
15000	10.28
17000	10.32
20000	10.41
22000	10.46
24000	10.46
30000	10.48
36000	10.49
42000	10.43
50000	10.28
75000	10.28

Table 3-42: MAPLHGR for ATRIUM 10XM Bottom Lattices
(References 2 and 13)

Bundles XMLC-4102B-16GV80, XMLC-4102B-15GV80, XMLC-4183B-12GV80 Lattices XMLCP-0720L-0G0a, XMLCB-0720L-0G0a, XMLCB-4574L-14G80, XMLCB-4562L-16G80, XMLCB-4574L-14GV80, XMLCB-4568L-15GV80	
Average Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	11.70
15000	11.70
20000	11.70
67000	6.60

Table 3-43: MAPLHGR for ATRIUM 10XM Bottom Lattice XMLCB-4667L-12G80
(References 2 and 13)

Bundle XMLC-4183B-12GV80 Lattice XMLCB-4667L-12G80	
Average Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	11.70
15000	11.70
20000	11.44
67000	6.62

Table 3-44: MAPLHGR for ATRIUM 10XM Top Lattices
(References 2 and 13)

Bundles **XMLC-4102B-16GV80, XMLC-4102B-15GV80, XMLC-4183B-12GV80** **Lattices** **XMLCT-0720L-0G0da, XMLCT-0720L-0G0a, XMLCT-4650L-12G60, XMLCT-4637L-14G80, XMLCTP-4637L-14G80, XMLCT-4630L-15GV80, XMLCTP-4630L-15GV80, XMLCT-4720L-12G60, XMLCT-4722L-12G80, XMLCTP-4722L-12G80**	
Average Planar Exposure (MWd/MTU)	**TLO MAPLHGR (kW/ft)**
0	11.70
15000	11.60
20000	11.21
67000	6.60

4. Operating Limit Minimum Critical Power Ratio

Technical Specification Sections 3.2.2, 3.4.1, and 3.7.7

The OLMCPRs for Q2C25 were established so that less than 0.1% of the fuel rods in the core are expected to experience boiling transition during an AOO initiated from rated or off-rated conditions and are based on the Technical Specifications SLMCPR values (Reference 2).

Tables 4-3 through 4-27 include MCPR limits for various specified EOOS conditions. The EOOS conditions separated by "/" in these tables represent single EOOS conditions and not any combination of conditions. Refer to Section 8 for a detailed explanation of allowable combined EOOS conditions.

4.1. Manual Flow Control MCPR Limits

The OLMCPR is determined for a given power and flow condition by evaluating the power-dependent MCPR and the flow-dependent MCPR and selecting the greater of the two.

4.1.1. Power-Dependent MCPR

The OLMCPR as a function of core thermal power ($MCPR_p$) is shown in Tables 4-3 through 4-26. $MCPR_p$ limits are dependent on scram times as described in Section 4.2, exposure as described in Section 4.3, fuel type, FWT, and whether the plant is in TLO or SLO. TLO limits for ATRIUM 10XM fuel are given in Tables 4-3 through 4-11 and SLO limits for ATRIUM 10XM are given in Tables 4-21 through 4-23. TLO limits for OPTIMA2 fuel are given in Tables 4-12 through 4-20 and SLO limits for OPTIMA2 fuel are given in Tables 4-24 through 4-26.

4.1.2. Flow-Dependent MCPR

Table 4-27 gives the OLMCPR limit as a function of the flow ($MCPR_f$) based on the applicable plant condition. These values are applicable to both ATRIUM 10XM and OPTIMA2 fuel.

4.2. Scram Time

TSSS, ISS, and NSS refer to scram speeds. The scram time values associated with these speeds are shown in Table 4-1. The TSSS scram times shown in Table 4-1 are the same as those specified in the Technical Specifications (Reference 4).

To utilize the OLMCPR limits for NSS in Tables 4-3, 4-6, 4-9, 4-12, 4-15, 4-18, 4-21, and 4-24, the average control rod insertion time at each control rod insertion fraction must be equal to or less than the NSS time shown in Table 4-1 below.

To utilize the OLMCPR limits for ISS in Tables 4-4, 4-7, 4-10, 4-13, 4-16, 4-19, 4-22 and 4-25, the average control rod insertion time at each control rod insertion fraction must be equal to or less than the ISS time shown in Table 4-1 below.

The "Average Control Rod Insertion Time" is defined as the sum of the control rod insertion times of all operable control rods divided by the number of operable control rods. Conservative adjustments to the NSS and ISS scram speeds were made to the analysis inputs to appropriately account for the effects of 1 stuck control rod and one additional control rod that is assumed to fail to scram (Reference 2).

To utilize the OLMCPR limits for TSSS in Tables 4-5, 4-8, 4-11, 4-14, 4-17, 4-20, 4-23, and 4-26, the control rod insertion time of each operable control rod at each control rod insertion fraction must be less than or equal to the TSSS time shown in Table 4-1 below. The Technical Specifications allow operation with up to 12 "slow" and 1 stuck control rod. One additional control rod is assumed to fail to scram for the system transient analyses performed to establish $MCPR_p$ limits (Reference 2). Conservative adjustments to the TSSS scram speeds were made to the analysis inputs to appropriately account for the effects of the slow and stuck rods on scram reactivity (Reference 2).

For cases below 38.5% power (P_{bypass}), the results are relatively insensitive to scram speed, and only TSSS analyses were performed (Reference 2).

Table 4-1: Scram Times
(References 2 and 4)

Control Rod Insertion Fraction (%)	NSS (seconds)	ISS (seconds)	TSSS (seconds)
5	0.324	0.36	0.48
20	0.694	0.72	0.89
50	1.510	1.58	1.98
90	2.670	2.80	3.44

4.3. Exposure Dependent MCPR Limits

Exposure-dependent $MCPR_p$ limits were established to support operation from BOC to NEOC (CAVEX of 35,057 MWd/MTU), NEOC to EOFPLB (CAVEX of 37,507 MWd/MTU), and EOFPLB to EOCLB (CAVEX of 38,325 MWd/MTU) as defined by the CAVEX values listed in Table 4-2. Note that the thermal limits are based on CAVEX. The limits at a later exposure range can be used earlier in the cycle as they are the same or more conservative.

Table 4-2: Exposure Basis for Transient Analysis
(Reference 2)

Core Average Exposure (CAVEX) (MWd/MTU)	Description
35,057	Break point for exposure-dependent $MCPR_p$ limits (NEOC)
37,507	Design basis rod patterns to EOFPL + 25 EFPD (EOFPLB)
38,325	EOCLB – Maximum licensing core exposure, including coastdown

4.4. Recirculation Pump ASD Settings

Technical Requirement Manual 2.1.a.1

Quad Cities 2 Cycle 25 was analyzed with a slow flow excursion event assuming a failure of the recirculation flow control system such that the core flow increases slowly to the maximum flow physically permitted by the equipment, assumed to be 112% of rated core flow (Reference 2); therefore, the recirculation pump ASD must be set to maintain core flow less than 112% (109.76 Mlb/hr) for all runout events.

Table 4-3: ATRIUM 10XM TLO $MCPR_p$ Limits for NSS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.01		1.48
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.93	1.48
	> 60	2.73	2.73	2.32			
FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.07		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.12		1.48
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.93	1.48
	> 60	2.73	2.73	2.33			

Table 4-4: ATRIUM 10XM TLO $MCPR_p$ Limits for ISS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**	
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48	
	> 60	2.73	2.73	2.32				
TBVOOS	≤ 60	3.44	3.44	2.63	2.02		1.48	
	> 60	3.54	3.54	2.77				
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.94	1.48	
	> 60	2.73	2.73	2.32				

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.08		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.13		1.48
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.94	1.48
	> 60	2.73	2.73	2.33			

Table 4-5: ATRIUM 10XM TLO $MCPR_p$ Limits for TSSS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.98		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.04		1.49
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.32	1.97	1.48
	> 60	2.73	2.73	2.32			
FHOOS							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.11		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.15		1.50
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.32	1.97	1.48
	> 60	2.73	2.73	2.33			

Table 4-6: ATRIUM 10XM TLO $MCPR_p$ Limits for NSS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)

(Reference 2)

Nominal FWT							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.01		1.48
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.95	1.48
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.07		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.12		1.49
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.95	1.48
	> 60	2.73	2.73	2.33			

Table 4-7: ATRIUM 10XM TLO $MCPR_p$ Limits for ISS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)

(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.02		1.48
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.95	1.48
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.08		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.13		1.50
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.95	1.48
	> 60	2.73	2.73	2.33			

Table 4-8: ATRIUM 10XM TLO $MCPR_p$ Limits for TSSS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.98		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.04		1.51
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.32	1.99	1.49
	> 60	2.73	2.73	2.32			
FHOOS							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.11		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.15		1.52
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.32	1.99	1.49
	> 60	2.73	2.73	2.33			

Table 4-9: ATRIUM 10XM TLO MCPR$_p$ Limits for NSS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.01		1.48
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.95	1.48
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.07		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.12		1.49
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.95	1.48
	> 60	2.73	2.73	2.33			

Table 4-10: ATRIUM 10XM TLO $MCPR_p$ Limits for ISS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.96		1.48
	> 60	2.73	2.73	2.32			
TBVOOS	≤ 60	3.44	3.44	2.63	2.02		1.48
	> 60	3.54	3.54	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.30	1.95	1.48
	> 60	2.73	2.73	2.32			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.08		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.13		1.50
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.30	1.95	1.48
	> 60	2.73	2.73	2.33			

Table 4-11: ATRIUM 10XM TLO $MCPR_p$ Limits for TSSS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**	
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.52	2.52	2.20	1.98		1.48	
	> 60	2.73	2.73	2.32				
TBVOOS	≤ 60	3.44	3.44	2.63	2.04		1.51	
	> 60	3.54	3.54	2.77				
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.52	2.52	2.32	2.32	1.99	1.49	
	> 60	2.73	2.73	2.32				

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.69	2.69	2.33	2.11		1.48
	> 60	2.73	2.73	2.33			
TBVOOS	≤ 60	3.57	3.57	2.73	2.15		1.52
	> 60	3.65	3.65	2.85			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.69	2.69	2.33	2.32	1.99	1.49
	> 60	2.73	2.73	2.33			

Table 4-12: OPTIMA2 TLO MCPR$_p$ Limits for NSS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.96		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.03		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.33	1.96	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.12		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.14		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.33	1.96	1.53
	> 60	2.71	2.71	2.35			

Table 4-13: OPTIMA2 TLO $MCPR_p$ Limits for ISS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	Core Flow (% rated)	Core Power (% rated)						
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.96		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.04		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.34	1.97	1.53
	> 60	2.71	2.71	2.35			
FHOOS							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.12		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.15		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.34	1.97	1.53
	> 60	2.71	2.71	2.35			

Table 4-14: OPTIMA2 TLO $MCPR_p$ Limits for TSSS Insertion Times, BOC to NEOC (35,057 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.97		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.07		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.35	2.00	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.14		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.18		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.35	2.00	1.53
	> 60	2.71	2.71	2.35			

Table 4-15: OPTIMA2 TLO $MCPR_p$ Limits for NSS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.96		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.03		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.33	1.97	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.12		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.14		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.33	1.97	1.53
	> 60	2.71	2.71	2.35			

Table 4-16: OPTIMA2 TLO $MCPR_p$ Limits for ISS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.96		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.04		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.34	1.98	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.12		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.15		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.34	1.98	1.53
	> 60	2.71	2.71	2.35			

Table 4-17: OPTIMA2 TLO MCPR$_p$ Limits for TSSS Insertion Times, NEOC to EOFPLB (37,507 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.97		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.07		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.35	2.02	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.14		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.18		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.35	2.02	1.53
	> 60	2.71	2.71	2.35			

Table 4-18: OPTIMA2 TLO $MCPR_p$ Limits for NSS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**						
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.96		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.03		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.33	1.97	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	**Core Flow (% rated)**	**Core Power (% rated)**					
		0	**25**	**≤ 38.5**	**> 38.5**	**70**	**100**
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.12		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.14		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.33	1.97	1.53
	> 60	2.71	2.71	2.35			

Table 4-19: OPTIMA2 TLO MCPR$_p$ Limits for ISS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT

EOOS Condition	Core Flow (% rated)	Core Power (% rated) 0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.96		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.04		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.34	1.98	1.53
	> 60	2.71	2.71	2.35			

FHOOS

EOOS Condition	Core Flow (% rated)	Core Power (% rated) 0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.12		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.15		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.34	1.98	1.53
	> 60	2.71	2.71	2.35			

Table 4-20: OPTIMA2 TLO MCPR$_p$ Limits for TSSS Insertion Times, EOFPLB to EOCLB (38,325 MWd/MTU CAVEX)
(Reference 2)

Nominal FWT								
EOOS Condition	Core Flow (% rated)	Core Power (% rated)						
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.41	2.41	2.10	1.97		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.24	3.24	2.49	2.07		1.54
	> 60	3.47	3.47	2.77			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.41	2.41	2.35	2.35	2.02	1.53
	> 60	2.71	2.71	2.35			

FHOOS							
EOOS Condition	Core Flow (% rated)	Core Power (% rated)					
		0	25	≤ 38.5	> 38.5	70	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	2.57	2.57	2.24	2.14		1.53
	> 60	2.71	2.71	2.35			
TBVOOS	≤ 60	3.36	3.36	2.57	2.18		1.54
	> 60	3.60	3.60	2.86			
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	2.57	2.57	2.35	2.35	2.02	1.53
	> 60	2.71	2.71	2.35			

Table 4-21: ATRIUM 10XM SLO $MCPR_p$ Limits for NSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	Core Power (% rated)				
	0	25	≤ 38.5	> 38.5	50
Base/TCV Stuck Closed/MSIVOOS	2.54	2.54	2.22	2.09	2.06
TBVOOS	3.46	3.46	2.65	2.09	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.54	2.54	2.34	2.32	2.20
FHOOS					
EOOS Condition (all include SLO)	Core Power (% rated)				
	0	25	≤ 38.5	> 38.5	50
Base/TCV Stuck Closed/MSIVOOS	2.71	2.71	2.35	2.09	2.06
TBVOOS	3.59	3.59	2.75	2.14	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.71	2.71	2.35	2.32	2.20

Table 4-22: ATRIUM 10XM SLO $MCPR_p$ Limits for ISS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.54	2.54	2.22	2.09	2.06
TBVOOS	3.46	3.46	2.65	2.09	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.54	2.54	2.34	2.32	2.20
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.71	2.71	2.35	2.10	2.06
TBVOOS	3.59	3.59	2.75	2.15	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.71	2.71	2.35	2.32	2.20

Table 4-23: ATRIUM 10XM SLO $MCPR_p$ Limits for TSSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.54	2.54	2.22	2.09	2.06
TBVOOS	3.46	3.46	2.65	2.09	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.54	2.54	2.34	2.34	2.22
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.71	2.71	2.35	2.13	2.06
TBVOOS	3.59	3.59	2.75	2.17	2.06
TCV Slow Closure/ PLUOOS/PCOOS	2.71	2.71	2.35	2.34	2.22

Table 4-24: OPTIMA2 SLO $MCPR_p$ Limits for NSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	Core Power (% rated)				
	0	25	≤ 38.5	> 38.5	50
Base/TCV Stuck Closed/MSIVOOS	2.43	2.43	2.17	2.17	2.14
TBVOOS	3.26	3.26	2.51	2.17	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.43	2.43	2.37	2.35	2.22
FHOOS					
EOOS Condition (all include SLO)	Core Power (% rated)				
	0	25	≤ 38.5	> 38.5	50
Base/TCV Stuck Closed/MSIVOOS	2.59	2.59	2.26	2.17	2.14
TBVOOS	3.38	3.38	2.59	2.17	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.59	2.59	2.37	2.35	2.22

Table 4-25: OPTIMA2 SLO $MCPR_p$ Limits for ISS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.43	2.43	2.17	2.17	2.14
TBVOOS	3.26	3.26	2.51	2.17	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.43	2.43	2.37	2.36	2.23
FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.59	2.59	2.26	2.17	2.14
TBVOOS	3.38	3.38	2.59	2.17	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.59	2.59	2.37	2.36	2.23

Table 4-26: OPTIMA2 SLO $MCPR_p$ Limits for TSSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.43	2.43	2.17	2.17	2.14
TBVOOS	3.26	3.26	2.51	2.17	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.43	2.43	2.37	2.37	2.25

FHOOS					
EOOS Condition (all include SLO)	**Core Power (% rated)**				
	0	**25**	**≤ 38.5**	**> 38.5**	**50**
Base/TCV Stuck Closed/MSIVOOS	2.59	2.59	2.26	2.17	2.14
TBVOOS	3.38	3.38	2.59	2.20	2.14
TCV Slow Closure/ PLUOOS/PCOOS	2.59	2.59	2.37	2.37	2.25

Table 4-27: ATRIUM 10XM and OPTIMA2 $MCPR_f$ Limits, All Insertion Times, All Exposures
(Reference 2)

EOOS Condition*	Core Flow (% rated)	$MCPR_f$ Limit
Base Case / FHOOS / PCOOS / PLUOOS / TCV Slow Closure / PLUOOS + PCOOS in TLO and SLO	0	1.70
	35	1.70
	108	1.18
Any Scenario** with One MSIVOOS	0	1.81
	35	1.81
	108	1.18
Any Scenario** with TBVOOS	0	1.90
	35	1.90
	108	1.35
Any Scenario** with 1 Stuck Closed TCV/TSV	0	1.70
	35	1.70
	108	1.18

* See Section 8 for further operating restrictions.
** “Any Scenario” implies any other combination of allowable EOOS conditions that is not otherwise covered by this table.

Note that the $MCPR_f$ limits for any scenario with 1 stuck closed TCV/TSV are identical to base case $MCPR_f$ limits. This is reflected in the thermal limit sets presented in Table 8-1.

5. Linear Heat Generation Rate

Technical Specification Sections 3.2.3, 3.4.1, and 3.7.7

The TMOL at rated conditions for the OPTIMA2 and ATRIUM 10XM fuel is established in terms of the maximum LHGR as a function of peak pellet (rod nodal) exposure. The LHGR limits for OPTIMA2 fuel are presented in Tables 5-1 through 5-5. The limits in Table 5-1 apply to OPTIMA2 lattices that do not require Gadolinia set down penalties as well as any natural blanket segments in OPTIMA2 fuel (lattice types 91 and 98). The limits in Tables 5-2 through 5-5 apply to OPTIMA2 lattices that do require Gadolinia set down penalties. The LHGR limits for ATRIUM 10XM fuel are presented in Table 5-6.

The power- and flow-dependent LHGR multipliers ($LHGRFAC_p$ and $LHGRFAC_f$) are applied directly to the LHGR limits to protect against fuel melting and overstraining of the cladding during an AOO (Reference 2). In all conditions, the margin to the LHGR limits is determined by applying the lowest multiplier from the applicable $LHGRFAC_p$ and $LHGRFAC_f$ multipliers for the power/flow statepoint of interest to the steady state LHGR limit (Reference 2).

$LHGRFAC_p$ and $LHGRFAC_f$ multipliers were established to support base case and all EOOS conditions for all Cycle 25 exposures and scram speeds. $LHGRFAC_p$ is scram speed-dependent for OPTIMA2 fuel. The $LHGRFAC_p$ multipliers for ATRIUM 10XM are presented in Table 5-7. The $LHGRFAC_p$ multipliers for OPTIMA2 are presented in Tables 5-8 and 5-9, with Table 5-8 containing multipliers for NSS and ISS and Table 5-9 containing multipliers for TSSS. NSS, ISS, and TSSS are defined in Section 4.2. The $LHGRFAC_f$ multipliers for ATRIUM 10XM and OPTIMA2 are presented in Table 5-10 and Table 5-11, respectively.

Table 5-1: LHGR Limits for OPTIMA2 Lattices 91, 98, 152, 153, 154, 155, 159, 160, 161, 162, 163, 164, 166, 167, 168, 169, 170, 171, 172, 173, 174, 178, 179, 180, 181, 185, 186, 187, 188, 189, and 190
(References 3 and 10)

Rod Nodal Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	13.72
14,000	13.11
23,000	12.22
57,000	8.87
62,000	8.38
75,000	3.43

Table 5-2: LHGR Limits for OPTIMA2 Lattices 156, 157, and 158
(Reference 10)

Rod Nodal Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	13.72
14,000	13.11
19,999	12.51
20,000	12.38
35,000	10.92
35,001	11.04
62,000	8.38
75,000	3.43

Table 5-3: LHGR Limits for OPTIMA2 Lattice 165
(Reference 10)

Rod Nodal Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	13.72
14,000	13.11
32,999	11.24
33,000	11.11
37,000	10.73
37,001	10.84
62,000	8.38
75,000	3.43

Table 5-4: LHGR Limits for OPTIMA2 Lattices 176, 177, 183 and 184
(Reference 3)

Rod Nodal Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	13.72
14,000	13.11
20,000	12.52
20,001	12.39
23,000	12.10
37,000	10.73
37,001	10.84
57,000	8.87
62,000	8.38
75,000	3.43

Table 5-5: LHGR Limits for OPTIMA2 Lattices 175 and 182
(Reference 3)

Rod Nodal Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	13.72
14,000	13.11
14,001	12.84
23,000	11.98
34,000	10.92
34,001	11.14
57,000	8.87
62,000	8.38
75,000	3.43

Table 5-6: LHGR Limits for ATRIUM 10XM
(Reference 2)

Peak Pellet Exposure (MWd/MTU)	LHGR Limit (kW/ft)
0	14.1
18,900	14.1
74,400	7.4

Table 5-7: ATRIUM 10XM LHGRFAC$_p$ Multipliers, All Insertion Times, All Exposures
(Reference 2)

Nominal FWT								
EOOS Condition	Core Flow (% rated)	Core Power (%rated)						
		0	25	≤ 38.5	> 38.5	50	80	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.51	0.51	0.59	0.67	0.70	0.93	1.00
	> 60	0.51	0.51	0.59				
TBVOOS	≤ 60	0.39	0.39	0.55	0.67	0.70	0.93	1.00
	> 60	0.38	0.38	0.51				
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.51	0.51	0.59	0.67	0.70	0.93	1.00
	> 60	0.51	0.51	0.59				
FHOOS								
EOOS Condition	Core Flow (% rated)	Core Power (%rated)						
		0	25	≤ 38.5	> 38.5	50	80	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.49	0.49	0.57	0.67	0.70	0.93	1.00
	> 60	0.47	0.47	0.55				
TBVOOS	≤ 60	0.38	0.38	0.51	0.67	0.70	0.93	1.00
	> 60	0.36	0.36	0.48				
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.49	0.49	0.57	0.67	0.70	0.93	1.00
	> 60	0.47	0.47	0.55				

Table 5-8: OPTIMA2 $LHGRFAC_p$ Multipliers, NSS and ISS Insertion Times, All Exposures
(Reference 2)

Nominal FWT

EOOS Condition	Core Flow (% rated)	Core Power (%rated)								
		0	25	≤ 38.5	> 38.5	50	60	70	80	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.58	0.58	0.63	0.69	0.76	0.83		0.88	0.99
	> 60	0.54	0.54	0.63						
TBVOOS	≤ 60	0.42	0.42	0.54	0.68	0.72	0.73		0.76	0.96
	> 60	0.42	0.42	0.50						
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.58	0.58	0.63	0.63	0.68		0.72	0.85	0.98
	> 60	0.54	0.54	0.63						

FHOOS

EOOS Condition	Core Flow (% rated)	Core Power (%rated)								
		0	25	≤ 38.5	> 38.5	50	60	70	80	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.53	0.53	0.60	0.63	0.70	0.76		0.87	0.97
	> 60	0.53	0.53	0.60						
TBVOOS	≤ 60	0.40	0.40	0.52	0.63	0.69	0.73		0.76	0.94
	> 60	0.40	0.40	0.49						
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.53	0.53	0.60	0.63	0.68		0.72	0.85	0.97
	> 60	0.53	0.53	0.60						

Table 5-9: OPTIMA2 $LHGRFAC_p$ Multipliers, TSSS Insertion Times, All Exposures
(Reference 2)

Nominal FWT

EOOS Condition	Core Flow (% rated)	Core Power (%rated)								
		0	25	≤ 38.5	> 38.5	50	60	70	80	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.58	0.58	0.63	0.69	0.76	0.83		0.88	0.97
	> 60	0.54	0.54	0.63						
TBVOOS	≤ 60	0.42	0.42	0.54	0.68	0.72	0.73		0.76	0.94
	> 60	0.42	0.42	0.50						
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.58	0.58	0.63	0.63	0.68		0.72	0.85	0.97
	> 60	0.54	0.54	0.63						

FHOOS

EOOS Condition	Core Flow (% rated)	Core Power (%rated)								
		0	25	≤ 38.5	> 38.5	50	60	70	80	100
Base/TCV Stuck Closed/MSIVOOS	≤ 60	0.53	0.53	0.60	0.63	0.70	0.76		0.87	0.96
	> 60	0.53	0.53	0.60						
TBVOOS	≤ 60	0.40	0.40	0.52	0.63	0.69	0.73		0.76	0.93
	> 60	0.40	0.40	0.49						
TCV Slow Closure/ PLUOOS/PCOOS	≤ 60	0.53	0.53	0.60	0.63	0.68		0.72	0.85	0.96
	> 60	0.53	0.53	0.60						

Table 5-10: ATRIUM 10XM $LHGRFAC_f$ Multipliers, All Insertion Times, All Exposures, All EOOS
(Reference 2)

Core Flow (% rated)	$LHGRFAC_f$
0.0	0.57
35.0	0.57
80.0	1.00
108.0	1.00

Table 5-11: OPTIMA2 $LHGRFAC_f$ Multipliers, All Insertion Times, All Exposures, All EOOS
(Reference 2)

Core Flow (% rated)	$LHGRFAC_f$
0.0	0.27
20.0	0.43
40.0	0.60
80.0	1.00
100.0	1.00
108.0	1.00

6. Control Rod Block Setpoints

Technical Specification Sections 3.3.2.1 and 3.4.1

The Rod Block Monitor Upscale Instrumentation Setpoints are determined from the relationships shown in Table 6-1.

Table 6-1: Rod Block Monitor Upscale Instrumentation Setpoints
(Reference 11)

ROD BLOCK MONITOR UPSCALE TRIP FUNCTION	ALLOWABLE VALUE
Two Recirculation Loop Operation	$0.65\ W_d + 56.1\%$
Single Recirculation Loop Operation	$0.65\ W_d + 51.4\%$

W_d – percent of recirculation loop drive flow required to produce a rated core flow of 98.0 Mlb/hr.

The setpoint may be lower/higher and will still comply with the CRWE analysis because CRWE is analyzed unblocked (Reference 2).

7. Stability Protection Setpoints

Technical Specifications Section 3.3.1.3

The OPRM PBDA Trip Settings are provided in Table 7-1.

Table 7-1: OPRM PBDA Trip Settings
(Reference 2)

PBDA Trip Amplitude Setpoint (Sp)	Corresponding Maximum Confirmation Count Setpoint (Np)
1.14	16

The PBDA is the only OPRM setting credited in the safety analysis as documented in the licensing basis for the OPRM system (Methodology 3).

The OPRM PBDA trip settings are based, in part, on the cycle specific OLMCPR and the power/flow dependent MCPR limits. Any change to the OLMCPR values and/or the power/flow dependent MCPR limits should be evaluated for potential impact on the OPRM PBDA trip settings.

The OPRM PBDA trip settings are applicable when the OPRM system is declared operable and the associated Technical Specifications are implemented.

8. Modes of Operation

The allowed modes of operation with combinations of EOOS are as described in Table 8-1. The EOOS conditions separated by "/" in these tables represent single EOOS conditions and not combinations of conditions.

Note that the following EOOS options have operational restrictions: all SLO, all EOOS options with 1 TCV/TSV stuck closed, and MSIVOOS. See Table 8-2 for specific restrictions.

Table 8-1: Modes of Operation
(Reference 2)

EOOS Option	Thermal Limit Set
Base Case	BASE CASE ➢ TLO or SLO ➢ Nominal FWT or FHOOS
TBVOOS due to Main Generator Load Reject Trip Relays OOS	PLUOOS/TCV SLOW C ➢ TLO for Nominal FWT*
TBVOOS	TBVOOS ➢ TLO or SLO ➢ Nominal FWT or FHOOS
1 TCV/TSV Stuck Closed	BASE CASE ➢ TLO or SLO ➢ Nominal FWT or FHOOS
One MSIVOOS	MSIVOOS ➢ TLO or SLO ➢ Nominal FWT or FHOOS
TCV Slow Closure	PLUOOS/TCV SLOW C ➢ TLO or SLO ➢ Nominal FWT or FHOOS
PLUOOS	PLUOOS/TCV SLOW C ➢ TLO or SLO ➢ Nominal FWT or FHOOS
PCOOS	PLUOOS/TCV SLOW C ➢ TLO or SLO ➢ Nominal FWT or FHOOS
PLUOOS and 1 TCV/TSV Stuck Closed	PLUOOS/TCV SLOW C ➢ TLO for Nominal FWT or FHOOS ➢ SLO for Nominal FWT**
PCOOS and PLUOOS	PLUOOS/TCV SLOW C ➢ TLO for Nominal FWT or FHOOS ➢ SLO for Nominal FWT**
PCOOS and 1 TCV/TSV Stuck Closed	PLUOOS/TCV SLOW C ➢ TLO for Nominal FWT or FHOOS ➢ SLO for Nominal FWT**

* SLO and FHOOS cannot be applied for the case of TBVOOS due to main generator load reject trip relays OOS.
** FHOOS cannot be applied to SLO for the cases of PLUOOS and 1 TCV/TSV Stuck Closed, for the case of PCOOS and PLUOOS, or for the case of PCOOS and 1 TCV/TSV Stuck Closed.

Common Notes:

1. All modes are allowed for operation at MELLLA, ICF (up to 108% rated core flow), and coastdown subject to the power restrictions in Table 8-2 (Reference 2). The licensing analysis supports full power operation to EOCLB (38,325 MWd/MTU CAVEX). Note that this value includes coastdown, where full power operation is not expected. Each OOS Option may be combined with each of the following conditions (Reference 2):
   a. Up to 40% of the TIP channels OOS
   b. Up to 50% of the LPRMs OOS
   c. An LPRM calibration frequency of up to 2500 EFPH

2. Nominal FWT results are valid for application within a +10°F/-30°F temperature band around the nominal FWT curve (Reference 2). For operation outside of nominal FWT, a FWT reduction of between 30ºF and 120ºF is supported for all FHOOS conditions listed in Table 8-1 for cycle operation through EOCLB (Reference 2). At lower power levels, the feedwater temperature reduction is less (Reference 2). Per Reference 12, there is a restriction which requires that for a FWT reduction greater than 100ºF, operation needs to be restricted to less than the 100% rod line. For a feedwater temperature reduction of between 30ºF and 120ºF, the FHOOS limits should be applied.

3. The base case and EOOS limits and multipliers support operation with 8 of 9 turbine bypass valves operational (i.e., one bypass valve out of service) with the exception of the TBVOOS condition in which all bypass valves are inoperable (Reference 2). Use of the response curve in TRM Appendix H supports operation with any single TBV OOS. TRM Appendix H facilitates analysis with one valve OOS in that the capacity at 0.45 seconds from start of TSV closure is equivalent to the total capacity with eight out of the nine valves in service (Reference 9). The analyses also support Turbine Bypass flow of 29.6% of vessel rated steam flow (Reference 9), equivalent to one TBV OOS (or partially closed TBVs equivalent to one closed TBV), if the assumed opening profile for the remaining TBVs is met. If the opening profile is NOT met, or if the TBV system CANNOT pass an equivalent of 29.6% of vessel rated steam flow, utilize the TBVOOS condition.

4. For the TBVOOS condition, analyses assume zero TBVs trip open and zero TBVs are available for pressure control during the slow portion of the transient analysis (Reference 9). Steam relief capacity is defined in Reference 9.

5. Failure of the main generator load reject trip relays to actuate (e.g., main generator load reject trip relays OOS) will render the turbine bypass valve system inoperable during load reject events (Reference 14). Operation with the main generator load reject trip relays out of service in TLO is supported by the TCV slow closure limits (Reference 2), meaning that, in accordance with Table 8-1, the PLUOOS/TCV SLOW C thermal limit set should be applied. This is applicable between 25% and 50% of rated thermal power.

Table 8-2: Core Operational Restrictions for EOOS Conditions
(Reference 2)

EOOS Condition	Core Flow (% of Rated)	Core Thermal Power (% of Rated Power)	Rod Line (%)
1 TCV/TSV Stuck Closed PCOOS and 1 TCV/TSV Stuck Closed PLUOOS and 1 TCV/TSV Stuck Closed	N/A	< 75	< 80
One MSIVOOS	N/A	< 75	N/A
SLO	< 51	< 50	N/A

All requirements for all applicable conditions listed in Table 8-2 MUST be met.

9. Methodology

The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. GE Topical Report NEDE-24011-P-A, Revision 14, “General Electric Standard Application for Reactor Fuel (GESTAR),” June 2000.
2. Removed.
3. GE Topical Report NEDO-32465-A, Revision 0, “Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications,” August 1996.
4. Westinghouse Topical Report CENPD-300-P-A, Revision 0, “Reference Safety Report for Boiling Water Reactor Reload Fuel,” July 1996.
5. Westinghouse Report WCAP-16081-P-A, Revision 0, “10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2,” March 2005.
6. Westinghouse Report WCAP-15682-P-A, Revision 0, “Westinghouse BWR ECCS Evaluation Model: Supplement 2 to Code Description, Qualification and Application,” April 2003.
7. Westinghouse Report WCAP-16078-P-A, Revision 0, “Westinghouse BWR ECCS Evaluation Model: Supplement 3 to Code Description, Qualification and Application to SVEA-96 Optima2 Fuel,” November 2004.
8. Westinghouse Topical Report WCAP-15836-P-A, Revision 0, “Fuel Rod Design Methods for Boiling Water Reactors – Supplement 1,” April 2006.
9. Westinghouse Topical Report WCAP-15942-P-A, Revision 0, “Fuel Assembly Mechanical Design Methodology for Boiling Water Reactors Supplement 1 to CENP-287,” March 2006.
10. Westinghouse Topical Report CENPD-390-P-A, Revision 0, “The Advanced PHOENIX and POLCA Codes for Nuclear Design of Boiling Water Reactors,” December 2000.
11. Westinghouse Report WCAP-16865-P-A, Revision 1, "Westinghouse BWR ECCS Evaluation Model Updates: Supplement 4 to Code Description, Qualification and Application," October 2011.
12. Exxon Nuclear Company Report XN-NF-81-58(P)(A), Revision 2 and Supplements 1 and 2, “RODEX2 Fuel Rod Thermal-Mechanical Response Evaluation Model,” March 1984.
13. Advanced Nuclear Fuels Corporation Report ANF-89-98(P)(A), Revision 1 and Supplement 1, “Generic Mechanical Design Criteria for BWR Fuel Designs,” May 1995.
14. Siemens Power Corporation Report EMF-85-74(P), Revision 0 Supplement 1 (P)(A) and Supplement 2 (P)(A), “RODEX2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model,” February 1998.
15. AREVA NP Topical Report BAW-10247PA, Revision 0, “Realistic Thermal-Mechanical Fuel Rod Methodology for Boiling Water Reactors,” February 2008.
16. Exxon Nuclear Company Topical Report XN-NF-80-19(P)(A), Volume 1 Revision 0 and Supplements 1 and 2, “Exxon Nuclear Methodology for Boiling Water Reactors – Neutronic Methods for Design and Analysis,” March 1983.

17. Exxon Nuclear Company Topical Report XN-NF-80-19(P)(A), Volume 4 Revision 1, “Exxon Nuclear Methodology for Boiling Water Reactors: Application of the ENC Methodology for BWR Reloads,” June 1986.

18. Exxon Nuclear Company Topical Report XN-NF-80-19(P)(A), Volume 3 Revision 2, “Exxon Nuclear Methodology for Boiling Water Reactors, THERMEX: Thermal Limits Methodology Summary Description,” January 1987.

19. Siemens Power Corporation Topical Report EMF-2158(P)(A), Revision 0, “Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2,” October 1999.

20. Siemens Power Corporation Report EMF-2245(P)(A), Revision 0, “Application of Siemens Power Corporation’s Critical Power Correlations to Co-Resident Fuel,” August 2000.

21. AREVA NP Report EMF-2209(P)(A), Revision 3, “SPCB Critical Power Correlation,” September 2009.

22. AREVA Topical Report ANP-10298P-A, Revision 1, “ACE/ATRIUM 10XM Critical Power Correlation,” March 2014.

23. AREVA NP Topical Report ANP-10307PA, Revision 0, “AREVA MCPR Safety Limit Methodology for Boiling Water Reactors,” June 2011.

24. Exxon Nuclear Company Report XN-NF-84-105(P)(A), Volume 1 Revision 0 and Volume 1 Supplements 1 and 2, “XCOBRA-T: A Computer Code for BWR Transient Thermal-Hydraulic Core Analysis,” February 1987.

25. Advanced Nuclear Fuels Corporation Report ANF-913(P)(A), Volume 1 Revision 1 and Volume 1 Supplements 2, 3, and 4, “COTRANSA2: A Computer Program for Boiling Water Reactor Transient Analyses,” August 1990.

26. Framatome ANP Report EMF-2361(P)(A), Revision 0, “EXEM BWR-2000 ECCS Evaluation Model,” May 2001.

27. Siemens Power Corporation Report EMF-2292 (P)(A), Revision 0, “ATRIUM™-10: Appendix K Spray Heat Transfer Coefficients,” September 2000.

28. Framatome ANP Topical Report ANF-1358(P)(A), Revision 3, “The Loss of Feedwater Heating Transient in Boiling Water Reactors,” September 2005.

29. Siemens Power Corporation Topical Report EMF-CC-074(P)(A), Volume 4 Revision 0, “BWR Stability Analysis: Assessment of STAIF with Input from MICROBURN-B2,” August 2000.

10. References

1. Exelon Generation Company, LLC and MidAmerican Energy Company, Docket No. 50-265, Quad Cities Nuclear Power Station, Unit 2 Renewed Facility Operating License No. DPR-30.

2. Framatome Report, ANP-3642P, Revision 1, “Quad Cities Unit 2 Cycle 25 Reload Safety Analysis,” February 2018.

3. Westinghouse Document, NF-BEX-16-2, Revision 0, “Quad Cities Nuclear Power Station Unit 2 Cycle 24 Reload Licensing Report,” January 2016.

4. Technical Specifications for Quad Cities 1 and 2, Table 3.1.4-1, “Control Rod Scram Times”.

5. Westinghouse Document, NF-BEX-15-174-NP, Revision 0, “Quad Cities Nuclear Power Station Unit 2 Cycle 24 MAPLHGR Report,” January 2016.

6. Westinghouse Letter, NF-BEX-15-109, Revision 0, “Bundle Design Report for Quad Cities Unit 2 Cycle 24,” August 4, 2015.

7. Westinghouse Document, NF-BEX-13-168-NP, Revision 0, “Quad Cities Nuclear Power Station Unit 2 Cycle 23 MAPLHGR Report,” January 2014.

8. Westinghouse Letter, NF-BEX-13-122, Revision 0, “Bundle Design Report for Quad Cities 2 Cycle 23,” September 9, 2013.

9. Exelon TODI, ES1700011, Revision 4, “Quad Cities Unit 2 Cycle 25 Plant Parameters Document,” November 7, 2017.

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