3.3 INSTRUMENTATION

3.3.15 Reactor Building (RB) Purge Isolation-High Radiation

LCO 3.3.15 One channel of Reactor Building Purge Isolation-High Radiation shall be OPERABLE.

APPLICABILITY: During movement of recently irradiated fuel assemblies within containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One channel inoperable.	A.1 Suspend movement of recently irradiated fuel assemblies within containment.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.15.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.15.2	Perform CHANNEL FUNCTIONAL TEST.	92 days
SR 3.3.15.3	Perform CHANNEL CALIBRATION.	18 months

3.9 REFUELING OPERATIONS

3.9.3 Containment Penetrations

LCO 3.9.3 The containment penetrations shall be in the following status:

a. The equipment hatch or outage equipment hatch (OEH) installed and held in place by four bolts;

b. A minimum of one door in each installed air lock and the door in the OEH (if installed) closed; and

c. Each penetration providing direct access from the containment atmosphere to the outside atmosphere either:

   1. closed by a manual or automatic isolation valve, blind flange, or equivalent; or

   2. capable of being closed by an OPERABLE containment purge or mini-purge valve.

APPLICABILITY: During movement of recently irradiated fuel assemblies within containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more containment penetrations not in required status.	A.1 Suspend movement of recently irradiated fuel assemblies within containment.	Immediately

3.9 REFUELING OPERATIONS

3.9.6 Refueling Canal Water Level

LCO 3.9.6 Refueling canal water level shall be maintained ≥ 156 ft Plant Datum.

APPLICABILITY: During movement of irradiated fuel assemblies within containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Refueling canal water level not within limit.	A.1 Suspend movement of recently irradiated fuel assemblies within containment.	Immediately
	AND	
	A.2 Initiate action to restore refueling canal water level to within limit.	Immediately

B 3.3 INSTRUMENTATION

B 3.3.15 Reactor Building (RB) Purge Isolation-High Radiation

BASES

BACKGROUND

The RB Purge Isolation-High Radiation Function closes the RB purge and RB mini-purge valves to isolate the RB atmosphere from the environment and minimize releases of radioactivity in the event an accident occurs.

The radiation monitoring system (RMA-1) measures the activity in a representative sample of air drawn in succession through a particulate sampler, an iodine sampler, and a gas sampler. The sensitive volume of the gas sampler is shielded with lead and monitored by a Geiger-Mueller detector. The air sample is taken from the center of the purge exhaust duct through a nozzle installed in the duct.

The monitor will alarm and initiate closure of the valves prior to exceeding the noble gas limits specified in the Offsite Dose Calculation Manual.

The closure of the purge and mini-purge valves ensures the RB remains as a barrier to fission product release.

APPLICABLE SAFETY ANALYSES

FSAR Chapter 14 LOCA analysis assumes RB purge and mini-purge lines are isolated within 60 seconds following initiation of the event. Since the early 1980's, this isolation time has only been practically applicable to the mini-purge valves since the large purge valves are required to be sealed closed during the MODES of plant operation (1, 2, 3, and 4) in which LOCAs are postulated to occur. Even

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

for mini-purge valves, design requirements on these valves require closure times on the order of 5 seconds. Thus, the purge isolation time of the current plant design is conservative to the original safety analysis.

The signal credited for initiating purge isolation in the original safety analysis is the RB Pressure - High ESAS signal and not RB Purge Isolation - High Radiation instrumentation. As such, design basis LOCA mitigation is not a basis for including this instrumentation.

RB purge isolation on high radiation is only required to maintain 10 CFR 20 limits during normal operations. However, this is not a basis for requiring a Technical Specification. Therefore, this Specification is not required in MODES 1, 2, 3 and 4.

Closure of the purge valves on high radiation is also not credited as part of the fuel handling accident (FHA) inside containment, which assumes fuel has decayed for 72 hours. The activity from the ruptured fuel assembly is assumed to be instantaneously released to the atmosphere in the form of a "puff" type release. Therefore, this specification is not required if moving fuel that has not been recently irradiated.

This specification is only required to minimize dose if moving fuel that has been recently irradiated (i.e., fuel that has occupied part of a critical reactor core within the previous 72 hours).

LCO

One channel of RB Purge Isolation-High Radiation instrumentation is required to be OPERABLE to ensure safety analysis assumptions regarding RB isolation are bounded. Operability of the instrumentation includes proper operation of the sample pump. This LCO addresses only the gas sampler portion of the System.

(continued)

BASES

APPLICABILITY

The RB Purge Isolation-High Radiation instrumentation shall be OPERABLE whenever movement of recently irradiated fuel (i.e., fuel that has occupied part of a critical reactor core within the previous 72 hours) within the RB is taking place. These specified conditions are indicative of those under which the potential for a fuel handling accident, and thus radiation release, is the greatest. While in MODES 5 and 6, when handling of recently irradiated fuel in the RB is not in progress, the isolation system does not need to be OPERABLE because the potential for a significant radioactive release is minimal and operator action is sufficient to ensure post accident offsite doses are maintained within the limits of 10 CFR 50.67 (Ref. 1).

ACTIONS

A.1

Condition A applies to failure of the high radiation purge isolation function during movement of recently irradiated fuel assemblies within containment.

The immediate Completion Time is consistent with the loss of RB isolation capability under conditions in which the fuel handling accidents involving handling recently irradiated fuel are possible and the high radiation function is required to provide automatic action to terminate the release.

SURVEILLANCE REQUIREMENTS

SR 3.3.15.1

This SR is the performance of the CHANNEL CHECK for the RB purge isolation-high radiation instrumentation once every 12 hours. The CHANNEL CHECK is a comparison of the parameter indicated on the radiation monitoring instrumentation channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between two instrument channels could be an indication of excessive instrument drift in one of the channels or of

(continued)

BASES

LCO (continued)

Fuel with burnup-enrichment combinations in the area above the upper curve has no restrictions on where it can be stored. Fuel with burnup-enrichment combinations in the area between the lower and upper curves must be stored in the peripheral cells of the pool. The peripheral cells are those that are adjacent to the walls of the spent fuel pool. Fuel with burnup-enrichment combinations in the area below the lower curve cannot be stored in Pool B, but must be stored in Pool A.

The LCO allows compensatory loading techniques, specified in the FSAR and applicable fuel handling procedures, as an alternative to storing fuel assemblies in accordance with Figures 3.7.15-1 and 3.7.15-2. This is acceptable since these loading patterns assure the same degree of subcriticality within the pool.

APPLICABILITY

In general, limiting fuel enrichment of stored fuel prevents inadvertent criticality in the storage pools. Inadvertent criticality is dependent on whether fuel is stored in the pools and is completely independent of plant MODE.

Therefore, this LCO is applicable whenever any fuel assembly is stored in high density fuel storage locations.

ACTIONS

A.1

Required Action A.1 is modified by a Note indicating LCO 3.0.3 does not apply. Since the design basis accident of concern in this Specification is an inadvertent criticality, and since the possibility or consequences of this event are independent of plant MODE, there is no reason to shutdown the plant if the LCO or Required Actions cannot be met.

When the configuration of fuel assemblies stored in the spent fuel pool is not in accordance with Figure 3.7.15-1 or Figure 3.7.15-2, immediate action must be taken to make the necessary fuel assembly movement(s) to bring the configuration into compliance. The Immediate Completion Time underscores the necessity of restoring spent fuel pool fuel loading to within the initial assumptions of the criticality analysis.

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B 3.9 REFUELING OPERATIONS

B 3.9.3 Containment Penetrations

BASES

BACKGROUND

An accident which occurs during movement of recently irradiated fuel assemblies within containment will have any released radioactivity limited from escaping to the environment. In MODE 6, the potential for containment pressurization as a result of an accident is not likely; therefore, the requirement to isolate the containment from the outside atmosphere is less stringent than those established for MODES 1 through 4. In order to make this distinction, the penetration requirements are referred to as "containment closure" rather than "containment OPERABILITY." Containment closure means that all potential escape paths for radioactivity are closed or capable of being closed by an OPERABLE containment purge or mini-purge valve.

The containment equipment hatch or outage equipment hatch (OEH) provides a means for moving large equipment and components into and out of containment. During movement of recently irradiated fuel assemblies within containment, the equipment hatch or OEH must be held in place by at least four bolts. The required number of bolts is based on dead weight and is acceptable due to the low likelihood of a pressurization event. Good engineering practice dictates that the bolts required by this LCO be approximately equally spaced. During movement of recently irradiated fuel assemblies within containment, containment closure is required; therefore, the door in the OEH (if installed) must always remain closed.

The containment air locks provide a means for personnel access during MODES 1, 2, 3, and 4 in accordance with LCO 3.6.2, "Containment Air Locks." Each air lock has a door at both ends. The doors are normally interlocked to prevent simultaneous opening when containment OPERABILITY is required. However, during periods of unit shutdown when containment OPERABILITY is not required, the door interlock mechanism may be disabled, allowing both doors of an installed air lock to remain open for extended periods when frequent containment ingress and egress is necessary. During movement of recently irradiated fuel assemblies within containment, containment closure is required; therefore, the door interlock mechanism may remain disabled, but one air lock door must always remain closed.

(continued)

BASES

BACKGROUND (continued)

The requirements on containment penetration closure ensure that a release of fission product radioactivity to the environment from the containment will be limited. The closure restrictions are sufficient to limit fission product radioactivity release from containment due to a fuel handling accident involving handling recently irradiated fuel during refueling.

In MODE 6, it is necessary to periodically recirculate/ exchange RB atmosphere in order to minimize radiation uptake during the conduct of refueling operations. The 48 inch purge valves are normally used for this purpose, but the mini-purge valves may be relied upon as well. Both valve types are automatically isolated on a unit vent-high radiation signal (from RM-A1). So long as one valve in the flow path is OPERABLE, these lines may remain unisolated during the subject plant conditions.

The other containment penetrations that provide direct access from containment atmosphere to outside atmosphere must be isolated by a minimum of one isolation device. Isolation may be achieved by an automatic or manual isolation valve, blind flange, or equivalent. Equivalent isolation methods include use of a material (e.g., temporary sealant) that can provide a temporary, atmospheric pressure ventilation barrier for the other containment penetrations during fuel movements involving recently irradiated fuel.

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BASES

APPLICABLE SAFETY ANALYSES

During movement of recently irradiated fuel assemblies within containment, the most severe radiological consequences result from a fuel handling accident involving handling recently irradiated fuel. The fuel handling accident is a postulated event that involves damage to irradiated fuel (Ref. 1). Fuel handling accidents include dropping a single irradiated fuel assembly and handling tool or a heavy object onto other irradiated fuel assemblies. The requirements of LCO 3.9.6, "Refueling Canal Water Level," in conjunction with the administrative limit on minimum decay time of 72 hours prior to irradiated fuel movement ensure that the release of fission product radioactivity subsequent to a fuel handling accident results in doses that are within the requirements specified in 10 CFR 50.67 even without containment closure.

Containment penetrations satisfy Criterion 3 of the NRC Policy Statement.

LCO

This LCO limits the consequences of a fuel handling accident involving handling recently irradiated fuel in containment by limiting the potential escape paths for fission product radioactivity from containment. The LCO requires any penetration providing direct access from the containment atmosphere to the outside atmosphere, including the equipment hatch or the Outage Equipment Hatch, to be closed except for penetrations containing an OPERABLE purge or mini-purge valve. For the containment purge and mini-purge valves to be considered OPERABLE, at least one valve in each penetration must be automatically isolable on an RB Purge-high radiation isolation signal.

The definition of "direct access from the containment atmosphere to the outside atmosphere" is any path that would allow for transport of containment atmosphere to any atmosphere located outside the containment structure. This includes the Auxiliary Building. As a general rule, closed or pressurized systems do not constitute a direct path

(continued)

BASES

LCO (continued)	between the RB and outside environments. All permanent and temporary penetration closures should be evaluated to assess the possibility for a release path to the outside environment. For the purpose of determining what constitutes a "direct access" path, no failure mechanisms should be applied to create a scenario which results in a "direct access" path. For example, line breaks, valve failures, power losses or natural phenomenon should not be postulated as part of the evaluation process.
APPLICABILITY	The containment penetration requirements are applicable during movement of recently irradiated fuel assemblies within containment because this is when there is a potential for the limiting fuel handling accident. In MODES 1, 2, 3, and 4, containment penetration requirements are addressed by LCO 3.6.1, "Containment." In MODES 5 and 6, when movement of irradiated fuel assemblies within containment is not being conducted, the potential for a fuel handling accident does not exist. Additionally, due to radioactive decay, a fuel handling accident involving fuel that has not been recently irradiated (i.e., fuel that has not occupied part of a critical reactor core within the previous 72 hours) will result in doses that are will within the guideline values specified in 10 CFR 50.67 even without containment closure capability. Therefore, under these conditions no requirements are placed on containment penetration status.
ACTIONS	A.1 With the containment equipment hatch, OEH, air locks, or any containment penetration that provides direct access from the containment atmosphere to the outside atmosphere not in the required status, including the containment purge or mini-purge valve penetrations not capable of automatic isolation when the penetrations are unisolated, the plant must be placed in a condition in which the isolation function is not needed. This is accomplished by immediately suspending movement of recently irradiated fuel assemblies within containment. Performance of these actions shall not preclude moving a component to a safe position.

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.9.3.1

This Surveillance demonstrates that each of the containment penetrations required to be in its closed position is in that position.

The Surveillance is performed every 7 days during movement of recently irradiated fuel assemblies within the containment. The Surveillance interval is selected to be commensurate with the normal duration of time to complete fuel handling operations.

As such, this surveillance ensures that a postulated fuel handling accident involving handling recently irradiated fuel that releases fission product radioactivity with containment will not result in a release of significant fission product radioactivity to the environment.

SR 3.9.3.2

This Surveillance demonstrates that each containment purge and mini-purge valve actuates to its isolation position on an actual or simulated high radiation signal. The 24 month Frequency is consistent with other similar instrumentation and valve testing requirements. The Surveillance ensures that the valves are capable of closing after a postulated fuel handling accident involving handling recently irradiated fuel to limit a release of fission product radioactivity from the containment. SR 3.6.3.5 demonstrates that the isolation time of each valve is in accordance with the Inservice Testing Program requirements.

REFERENCES

1. FSAR, Section 14.2.2.3.

B 3.9 REFUELING OPERATIONS

B 3.9.6 Refueling Canal Water Level

BASES

BACKGROUND	The movement of irradiated fuel assemblies within containment requires a minimum refueling canal water level of 156 ft plant datum. This maintains sufficient water level above the fuel contained in the vessel and the bottom of the fuel transfer canal, and the spent fuel pool to ensure iodine fission product activity is retained in the water to a level consistent with the dose analysis of a fuel handling accident (Ref. 4). Sufficient iodine activity would be retained to limit offsite doses from the accident to well within 10 CFR 50.67 limits (Ref. 3).
APPLICABLE SAFETY ANALYSES	During movement of irradiated fuel assemblies, the water level in the refueling canal is an assumed initial condition in the analysis of the fuel handling accident in containment. This relates to the assumption that 99% of the total iodine released from the fuel is retained by the refueling canal water. There are postulated drop scenarios where there is < 23 ft above the top of the fuel bundle and the surface. In particular, this is the case for the period of time during which the assembly travels between the cavity and the deep end of the refueling canal. During this time, there is potentially 21 feet of water between the reactor vessel flange (135 ft plant datum) and the surface of the pool. The iodine retention factors used in the dose assessment are still conservative at water levels of 21 feet above the damaged fuel (Ref. 4). The 156 ft value was chosen to be consistent with the level specified for LCO 3.7.13, "Fuel Storage Pool Water Level" and plant configuration.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The fuel handling accident analysis inside containment is described in Reference 4. With a minimum water level of 23 ft above the stored fuel, and the administrative limit on minimum decay time of 72 hours prior to movement of irradiated fuel in the vessel, analyses demonstrate that the iodine release due to a postulated fuel handling accident is adequately captured by the water such that offsite doses are maintained within allowable limits (Ref. 3).

Refueling canal water level satisfies Criterion 2 of the NRC Policy Statement.

LCO

A minimum refueling canal water level of 156 ft plant datum is required to ensure that the radiological consequences of a postulated fuel handling accident inside containment are within acceptable limits. This minimum level also ensures an adequate operational window between the surface of the pool and the transfer winch for the RB fuel handling equipment.

APPLICABILITY

This Specification is applicable when moving irradiated fuel assemblies within the containment. The LCO minimizes the potential of a fuel handling accident in containment which results in offsite doses greater than those calculated by the safety analysis. If irradiated fuel is not present in containment, there can be no significant radioactivity release as a result of a postulated fuel handling accident. Water level requirements for fuel handling accidents postulated to occur in the spent fuel pool are addressed by LCO 3.7.13, "Fuel Storage Pool Water Level."

ACTIONS

A.1

With a refueling canal water level of < 156 ft plant datum, all movement of irradiated fuel assemblies shall be suspended immediately to preclude a fuel handling accident from occurring. The suspension of fuel movement shall not preclude completion of movement of a component to a safe position.

(continued)

BASES

ACTIONS

A.2

In addition to immediately suspending movement of irradiated fuel, actions to restore refueling canal water level must be initiated immediately. The immediate Completion Time is based on engineering judgment. When increasing refueling canal water level the boron concentration of the make-up and the effect of this concentration on the minimum specified in the COLR (Ref. LCO 3.9.1) must be considered.

SURVEILLANCE REQUIREMENTS

SR 3.9.6.1

Verification of a minimum refueling canal water level of 156 ft plant datum ensures that the design basis for the postulated fuel handling accident analysis during refueling operations is met. Water at the required level above the top of the reactor vessel flange limits the consequences of damaged fuel rods that are assumed to result from a postulated fuel handling accident inside containment (Ref. 2).

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 of valve positions, which make significant unplanned level changes unlikely.

REFERENCES

1. Deleted.

2. FSAR Section 14.2.2.3.

3. 10 CFR 50.67.

4. FPC Calculation N-00-0001.