Industry/TSTF Standard Technical Specification Change Traveler

Allow Equipment Hatch to be Open During Fuel Movement

NUREGs Affected: ☑ 1430 ☑ 1431 ☑ 1432 ☐ 1433 ☐ 1434

Classification: 1) Technical Change Recommended for CLIIP?: Yes

Priority: 1)High

Simple or Complex Change: Complex

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1.0 Description

Revise the Containment Penetrations LCO to allow the equipment hatch to remain open during movement of [recently] irradiated fuel assemblies within containment.

2.0 Proposed Change

The containment penetration specification requires "The equipment hatch closed and held in place by [four] bolts." The proposed change would revise the LCO to state, "The equipment hatch [capable of being] closed." This allows the containment equipment hatch to be treated in a manner similar to all other containment penetrations, provided such treatment is supported by confirmatory dose calculations approved by the NRC staff and commitments to implement acceptable administrative procedures to ensure that in the event of a refueling accident the open equipment hatch can and will be promptly closed following containment evacuation.

In addition, an error in the LCO Bases is corrected. References to CORE ALTERATIONS were added by TSTF-68 and removed by TSTF-51, which as approved after TWSTF-68. These references should have been removed in Revision 2. This is corrected and indicated by an asterisk in the right margin close to the changes.

3.0 Background

During a typical refueling outage, one of the critical factors used in scheduling the outage is the availability of the equipment hatch. Current technical specifications require the equipment hatch to be closed during movement of [recently] irradiated fuel in containment. Because of the limitations on space within the containment the requirement to have the equipment hatch closed during fuel movement results in most activities in containment hinging on the scheduling of movement of equipment in and out of the equipment hatch, finding storage locations for equipment, rearranging equipment to make room for maintenance, and removing trash and replaced components. If the containment equipment hatch could remain open during movement of [recently] irradiated fuel, the extra time would allow equipment to be moved into and out of the containment other than during critical path time and in a more schedule efficient manner.

The proposed changes permit the optimization of outages to achieve an overall risk reduction while also reducing the outage time and cost. A significant contributor to this risk reduction is the ability to postpone operations early in the outage that, from a practical standpoint to achive a short outage duration, must be performed soon after shutdown when there is no TS requirement for a closed containment. The proposed change will allow some of these operations to be accomplished later, when the reactor vessel is open and the core is covered by the TS required level of water at which time the risk of a severe core damage accident is low.

There are a large number of people in containment during refueling. Should a fuel handling accident occur, the containment could be evacuated more expeditiously with the equipment hatch open than with it closed, thus enhancing personnel safety. In the event of a FHA inside containment, an open equipment hatch will be the most limiting containment opening with respect to establishment of containment closure. The equipment hatch door will be closed as part of an evacuation of containment, allowing personnel to evacuate through the equipment hatch in addition to the personnel air lock. However, in order to minimize the impact on the health and safety of the public, equipment hatch closure, as well as closure of the personnel air lock and other penetrations, will be completed within the timeframe assumed in the offsite dose analyses.

The condition of the open equipment hatch will be monitored during irradiated fuel movement inside containment to assure closure of the equipment hatch door following containment evacuation. The assurance that the open equipment hatch will remain capable of closure will be administratively controlled in site procedures, similar to the controls applied to the personnel air lock and other containment penetrations. For example, any items passing through the equipment hatch that could obstruct closure of the door will have either quick disconnect capability or will be readily removable.

The savings gained from leaving the equipment hatch open during a refueling outage would be due to greater efficiency in the scheduling of refueling activities and could result in significant cost savings over the life of the plant.

The detailed description of what consitutes equipment hatch closure is already located in the Bases, and in greater detail. Therefore, the LCO phrase, "and held in place by [four] bolts is deleted since this level of detail does not meet the inclusion requirements of 10 CFR 50.36. In addition, the proposed change corrects the reference to CORE ALTERATIONS found in LCO 3.9.3 Bases that was added by TSTF-69 and later removed by TSTF-51.

4.0 Technical Analysis

During movement of [recently] irradiated fuel assemblies within containment, the most severe radiological consequences result from a fuel handling accident (FHA). The acceptance limits for a FHA are contained in Standard Review Plan (SRP) Section 15.7.4 and are defined as "well within" 10CFR100 limits for offsite radiation exposure. The "well within" 10CFR100 limits are 25% of the 10CFR100 values or 75 rem thyroid and 6 rem whole body.

The Technical Specifications have traditionally limited the consequences of a FHA inside containment by limiting the potential escape paths for fission product radioactivity released within containment. However, this philosophy has been replaced with a new approach which demonstrates that the effects of an FHA with the containment personnel air lock and containment penetrations open will still meet the SRP acceptance criteria. These analyses typically assume no holdup of radioactive material within the containment. However, the LCO still requires the containment equipment hatch to be closed, even though that is not an assumption in the FHA dose analysis.

The proposed change to the Containment Penetration TS allows the containment equipment hatch to be open during movement of [recently] irradiated fuel within the containment provided that it can be closed. The proposed revisions must be justified by an FHA analysis that demonstrates that the offsite doses are acceptable. The same requirements imposed on the containment personnel air lock and other penetrations are imposed on the equipment hatch. If the plant design does not allow the equipment hatch to be closed following a FHA in a timeframe consistent with the analysis, this change cannot be applied.

This generic change to the Containment Penetration TS is similar to the license amendments issued to Arkansas Nuclear One, Units 1 and 2 on April 16, 1999 and Waterford SES Unit 3 on October 2, 2000. These amendments provided approval to have the equipment hatch open during movement of irradiated fuel within the containment provided the door was capable of being closed following a required evacuation of containment.

5.0 Regulatory Analysis

5.1 No Significant Hazards Consideration

The TSTF has evaluated whether or not a significant hazards consideration is involved with the proposed generic change by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed change would allow the containment equipment hatch to remain open during irradiated fuel movement in containment. This penetration is not an initiator of any accident. The probability of a fuel handling accident in the containment (FHA) is unaffected by the position of the equipment hatch. Adoption of this change requires analyses, approved by the NRC staff, demonstrating that the dose consequences of a FHA with the equipment hatch open are acceptable. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed change does not involve the addition or modification of any plant equipment. Also, the proposed change would not alter the design, configuration, or method of operation of the plant beyond the standard functional capabilities of the equipment. The proposed change involves a change to the Technical Specifications (TS) that would allow the equipment hatch to remain open during irradiated fuel movement within the containment. Having the equipment hatch open does not create the possibility of a new accident. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

This proposed change has the potential for an increased dose at the site boundary due to a FHA; however, the analysis demonstrates that the resultant doses are well within the appropriate acceptance limits. The margin of safety has not been significantly reduced. The offsite and control room doses due to a FHA with the equipment hatch open must be evaluated with conservative assumptions to ensure the calculation bounds the expected dose. Administrative provisions that facilitate closing the equipment hatch following an evacuation of the containment further reduces the offsite doses in the event of a FHA and provides additional margin to the calculated offsite doses. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, the TSTF concludes that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

Utilization of the proposed change requires NRC staff approval of confirmatory dose analyses which demonstrate acceptable radiological consequences. Therefore, this change does not affect compliance with any regulatory requirement. Based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the approval of the proposed change will not be inimical to the common defense and security or to the health and safety of the public.

6.0 Environmental Consideration

A review has determined that the proposed change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed change.

7.0 References

None

Revision History

OG Revision 0 **Revision Status: Active** **Next Action: NRC**

Revision Proposed by: Waterford

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 01-Aug-01

Owners Group Comments:
(No Comments)

Owners Group Resolution: Approved Date: 01-Aug-01

TSTF Review Information

TSTF Received Date: 01-Nov-01 Date Distributed for Review: 18-Jan-02

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 05-Feb-02

NRC Review Information

NRC Received Date: 03-Jun-02

OG Revision 0/ **Revision Status: Active** **Next Action: NRC**

Affected Technical Specifications

Bkgnd 3.9.3 Bases	Containment Penetrations	NUREG(s)- 1430 1432 Only
LCO 3.9.3	Containment Penetrations	NUREG(s)- 1430 1432 Only
LCO 3.9.3 Bases	Containment Penetrations	NUREG(s)- 1430 1432 Only
Bkgnd 3.9.4 Bases	Containment Penetrations	NUREG(s)- 1431 Only
LCO 3.9.4	Containment Penetrations	NUREG(s)- 1431 Only
LCO 3.9.4 Bases	Containment Penetrations	NUREG(s)- 1431 Only

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 closed [capable of being] and ~~held in place by four bolts~~,

b. One door in each air lock is [capable of being] 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 and Exhaust Isolation System.

- NOTE -

Penetration flow path(s) providing direct access from the containment atmosphere to the outside atmosphere may be unisolated under administrative controls.

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

B 3.9 REFUELING OPERATIONS

B 3.9.3 Containment Penetrations

BASES

BACKGROUND

During movement of [recently] irradiated fuel assemblies within containment, a release of fission product radioactivity within containment will be restricted from escaping to the environment when the LCO requirements are met. In MODES 1, 2, 3, and 4, this is accomplished by maintaining containment OPERABLE as described in LCO 3.6.1, "Containment." In MODE 6, the potential for containment pressurization as a result of an accident is not likely; therefore, requirements to isolate the containment from the outside atmosphere can be less stringent. The LCO requirements are referred to as "containment closure" rather than "containment OPERABILITY." Containment closure means that all potential escape paths are closed or capable of being closed. Since there is no potential for containment pressurization, the Appendix J leakage criteria and tests are not required.

The containment serves to contain fission product radioactivity that may be released from the reactor core following an accident, such that offsite radiation exposures are maintained well within the requirements of 10 CFR 100. Additionally, the containment provides radiation shielding from the fission products that may be present in the containment atmosphere following accident conditions.

[capable of being closed and]

The containment equipment hatch, which is part of the containment pressure boundary, 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 must be held in place by at least four bolts. Good engineering practice dictates that the bolts required by this LCO be approximately equally spaced.

The containment air locks, which are also part of the containment pressure boundary, provide a means for personnel access during MODES 1, 2, 3, and 4 unit operation 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. During periods of unit shutdown when containment closure is not required, the door interlock mechanism may be disabled, allowing both doors of an air lock to remain open for extended periods when frequent containment entry is necessary. During movement of [recently] irradiated fuel assemblies within containment, containment closure is required; therefore, the door

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APPLICABLE SAFETY ANALYSES (continued)

without containment closure capability], ensures 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 100. The acceptance limits for offsite radiation exposure are contained in Ref. 2.

Containment penetrations satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

- REVIEWER'S NOTE -

The allowance to have containment personnel airlock doors open and penetration flow paths with direct access from the containment atmosphere to the outside atmosphere to be unisolated during fuel movement and CORE ALTERATIONS is based on (1) confirmatory dose calculations of a fuel handling accident as approved by the NRC staff which indicate acceptable radiological consequences and (2) commitments from the licensee to implement acceptable administrative procedures that ensure in the event of a refueling accident (even though the containment fission product control function is not required to meet acceptable dose consequences) that the open airlock can and will be promptly closed following containment evacuation and that the open penetration(s) can and will be promptly closed. The time to close such penetrations or combination of penetrations shall be included in the confirmatory dose calculations.

the containment equipment hatch and

equipment hatch and

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 to be closed except for the OPERABLE containment purge and exhaust penetrations [and the containment personnel airlocks]. For the OPERABLE containment purge and exhaust penetrations, this LCO ensures that these penetrations are isolable by the RB purge isolation signal. The OPERABILITY requirements for this LCO ensure that the automatic purge and exhaust valve closure times specified in the FSAR can be achieved and therefore meet the assumptions used in the safety analysis to ensure releases through the valves are terminated such that radiological doses are within the acceptance limit.

equipment hatch and

The LCO is modified by a Note allowing penetration flow paths with direct access from the containment atmosphere to the outside atmosphere to be unisolated under administrative controls. Administrative controls ensure that 1) appropriate personnel are aware of the open status of the

BASES

LCO (continued)

penetration flow path during CORE ALTERATIONS or movement of irradiated fuel assemblies within containment, and 2) specified individuals are designated and readily available to isolate the flow path in the event of a fuel handling accident.

equipment hatch and

The containment personnel airlock doors may be open during movement of irradiated fuel in the containment and during CORE ALTERATIONS provided that one door is capable of being closed in the event of a fuel handling accident. Should a fuel handling accident occur inside containment, one personnel airlock door will be closed following an evacuation of containment.

the equipment hatch and at least one door in each airlock are

in each airlock

the equipment hatch and

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. 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 handling recently irradiated fuel (i.e. fuel that has occupied part of a critical reactor core within the previous [ ] days) will result in doses that are well within the guidelines values specified in 10 CFR 100 even without containment closure capability.] Therefore, under these conditions no requirements are placed on containment penetration status.

- REVIEWER'S NOTE -

The addition of the term "recently" associated with handling irradiated fuel in all of the containment function Technical Specification requirements is only applicable to those licensees who have demonstrated by analysis that after sufficient radioactive decay has occurred, off-site doses resulting from a fuel handling accident remain below the Standard Review Plan limits (well within 10CFR100).

Additionally, licensees adding the term "recently" must make the following commitment which is consistent with draft NUMARC 93-01, Revision 3, Section 11.2.6 "Safety Assessment for Removal of Equipment from Service During Shutdown Conditions", subheading "Containment - Primary (PWR)/Secondary (BWR)".

"The following guidelines are included in the assessment of systems removed from service during movement of irradiated fuel:

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 closed and held in place by [four] bolts,

b. One door in each air lock [capable of being] 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 and Exhaust Isolation System.

- NOTE -

Penetration flow path(s) providing direct access from the containment atmosphere to the outside atmosphere may be unisolated under administrative controls.

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

B 3.9 REFUELING OPERATIONS

B 3.9.3 Containment Penetrations

BASES

BACKGROUND

During movement of [recently] irradiated fuel assemblies within containment, a release of fission product radioactivity within the containment will be restricted from escaping to the environment when the LCO requirements are met. In MODES 1, 2, 3, and 4, this is accomplished by maintaining containment OPERABLE as described in LCO 3.6.1, "Containment." In MODE 6, the potential for containment pressurization as a result of an accident is not likely; therefore, requirements to isolate the containment from the outside atmosphere can be less stringent. The LCO requirements are referred to as "containment closure" rather than "containment OPERABILITY." Containment closure means that all potential escape paths are closed or capable of being closed. Since there is no potential for containment pressurization, the Appendix J leakage criteria and tests are not required.

The containment serves to contain fission product radioactivity that may be released from the reactor core following an accident, such that offsite radiation exposures are maintained well within the requirements of 10 CFR 100. Additionally, the containment structure provides radiation shielding from the fission products that may be present in the containment atmosphere following accident conditions.

[capable of being closed and]

The containment equipment hatch, which is part of the containment pressure boundary, 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 must be held in place by at least four bolts. Good engineering practice dictates that the bolts required by this LCO be approximately equally spaced.

The containment air locks, which are also part of the containment pressure boundary, provide a means for personnel access during MODES 1, 2, 3, and 4 operation 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. During periods of shutdown when containment closure is not required, the door interlock mechanism may be disabled, allowing both doors of an air lock to remain open for extended periods when frequent containment entry is necessary. During movement of [recently] irradiated fuel assemblies within containment, containment closure is required; therefore, the door interlock mechanism

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APPLICABLE SAFETY ANALYSES

During CORE ALTERATIONS or movement of 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. 2). Fuel handling accidents, analyzed in Ref. 3, 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 Water Level," in conjunction with minimum decay time of [72] hours prior to [irradiated fuel movement with containment closure capability or a minimum decay time of [X] days without containment closure capability], ensure that the release of fission product radioactivity, subsequent to a fuel handling accident, results in doses that are well within the guideline values specified in 10 CFR 100. The acceptance limits for offsite radiation exposure are contained in Standard Review Plan Section 15.7.4, Rev. 1 (Ref. 3), which defines "well within" 10 CFR 100 to be 25% or less of the 10 CFR 100 values.

Containment penetrations satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

- REVIEWER'S NOTE -

The allowance to have the containment equipment hatch and containment personnel airlock doors open and penetration flow paths with direct access from the containment atmosphere to the outside atmosphere to be unisolated during fuel movement and CORE ALTERATIONS is based on (1) confirmatory dose calculations of a fuel handling accident as approve by the NRC staff which indicate acceptable radiological consequences and (2) commitments from the licensee to implement acceptable administrative procedures that ensure in the event of a refueling accident (even thought the containment fission product control function is not required to meet acceptable dose consequences) that the open equipment hatch and airlock can and will be promptly closed following containment evacuation and that the open penetrations or combination of penetrations shall be included in the confirmatory dose calculations.

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 released within containment. The LCO requires any penetration providing direct access from the containment atmosphere to the outside atmosphere to be closed except for the OPERABLE containment purge and exhaust penetrations [and the containment personnel airlocks]. For the OPERABLE containment purge and exhaust penetrations, this LCO ensures that

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LCO (continued)

these penetrations are isolable by the Containment Purge and Exhaust Isolation System. The OPERABILITY requirements for this LCO ensure that the automatic purge and exhaust valve closure times specified in the FSAR can be achieved and therefore meet the assumptions used in the safety analysis to ensure releases through the valves are terminated, such that the radiological doses are within the acceptance limit.

The LCO is modified by a Note allowing penetration flow paths with direct access from the containment atmosphere to the outside atmosphere to be unisolated under administrative controls. Administrative controls ensure that 1) appropriate personnel are aware of the open status of the penetration flow path during CORE ALTERATIONS or movement of irradiated fuel assemblies within containment, and 2) specified individuals are designated and readily available to isolate the flow path in the event of a fuel handling accident. *

The containment personnel airlock doors may be open during movement of irradiated fuel in the containment and during CORE ALTERATIONS * provided that one door is capable of being closed in the event of a fuel handling accident. Should a fuel handling accident occur inside containment, one personnel airlock door will be closed following an evacuation of containment.

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 handling recently irradiated fuel (i.e., fuel that has occupied part of a critical reactor core within the previous [ ] days) will result in doses that are well within the guideline values specified in 10 CFR 100 even without containment closure capability.] Therefore, under these conditions no requirements are placed on containment penetration status.

- REVIEWER'S NOTE -

The addition of the term "recently" associated with handling irradiated fuel in all of the containment function Technical Specification requirements is only applicable to those licensees who have demonstrated by analysis that after sufficient radioactive decay has occurred, off-site doses

3.9 REFUELING OPERATIONS

3.9.4 Containment Penetrations

LCO 3.9.4 The containment penetrations shall be in the following status:

a. The equipment is hatch closed [capable of being] and ~~held~~ in place by [four] bolts.

b. One door in each air lock is [capable of being] closed, and

c. Each penetration providing direct access from the containment atmosphere to the outside atmosphere is 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 and Exhaust Isolation System.

- NOTE -

Penetration flow path(s) providing direct access from the containment atmosphere to the outside atmosphere may be unisolated under administrative controls.

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

B 3.9 REFUELING OPERATIONS

B 3.9.4 Containment Penetrations

BASES

BACKGROUND

During movement of [recently] irradiated fuel assemblies within containment, a release of fission product radioactivity within containment will be restricted from escaping to the environment when the LCO requirements are met. In MODES 1, 2, 3, and 4, this is accomplished by maintaining containment OPERABLE as described in LCO 3.6.1, "Containment." In MODE 6, the potential for containment pressurization as a result of an accident is not likely; therefore, requirements to isolate the containment from the outside atmosphere can be less stringent. The LCO requirements are referred to as "containment closure" rather than "containment OPERABILITY." Containment closure means that all potential escape paths are closed or capable of being closed. Since there is no potential for containment pressurization, the Appendix J leakage criteria and tests are not required.

The containment serves to contain fission product radioactivity that may be released from the reactor core following an accident, such that offsite radiation exposures are maintained well within the requirements of 10 CFR 100. Additionally, the containment provides radiation shielding from the fission products that may be present in the containment atmosphere following accident conditions.

[capable of being closed and]

The containment equipment hatch, which is part of the containment pressure boundary, 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 must be held in place by at least four bolts. Good engineering practice dictates that the bolts required by this LCO be approximately equally spaced.

The containment air locks, which are also part of the containment pressure boundary, provide a means for personnel access during MODES 1, 2, 3, and 4 unit operation 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. During periods of unit shutdown when containment closure is not required, the door interlock mechanism may be disabled, allowing both doors of an air lock to remain open for extended periods when frequent containment entry is necessary. During movement of [recently] irradiated fuel assemblies within containment, containment closure is required; therefore, the door

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APPLICABLE SAFETY ANALYSES

During CORE ALTERATIONS or movement of 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. 2). Fuel handling accidents, analyzed in Reference 3, include dropping a single irradiated fuel assembly and handling tool or a heavy object onto other irradiated fuel assemblies. The requirements of LCO 3.9.7, "Refueling Cavity Water Level," in conjunction with a minimum decay time of 100 hours prior to [irradiated fuel movement with containment closure capability or a minimum decay time of [X] days without containment closure capability], ensures that the release of fission product radioactivity, subsequent to a fuel handling accident, results in doses that are well within the guideline values specified in 10 CFR 100. Standard Review Plan, Section 15.7.4, Rev. 1 (Ref. 3), defines "well within" 10 CFR 100 to be 25% or less of the 10 CFR 100 values. The acceptance limits for offsite radiation exposure will be 25% of 10 CFR 100 values or the NRC staff approved licensing basis (e.g., a specified fraction of 10 CFR 100 limits).

Containment penetrations satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

- REVIEWER'S NOTE -

The allowance to have containment personnel air lock doors open and penetration flow paths with direct access from the containment atmosphere to the outside atmosphere to be unisolated during fuel movement and CORE ALTERATIONS is based on (1) confirmatory dose calculations of a fuel handling accident as approved by the NRC staff which indicate acceptable radiological consequences and (2) commitments from the licensee to implement acceptable administrative procedures that ensure in the event of a refueling accident (even though the containment fission product control function is not required to meet acceptable dose consequences) that the open airlock can and will be promptly closed following containment evacuation and that the open penetration(s) can and will be promptly closed. The time to close such penetrations or combination of penetrations shall be included in the confirmatory dose calculations.

the containment equipment hatch and

equipment hatch and

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 released within containment. The LCO requires any penetration providing direct access from the containment atmosphere to the outside atmosphere to be closed except for the OPERABLE containment purge and exhaust penetrations

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LCO (continued)

equipment hatch and

[and the containment personnel air locks]. For the OPERABLE containment purge and exhaust penetrations, this LCO ensures that these penetrations are isolable by the Containment Purge and Exhaust Isolation System. The OPERABILITY requirements for this LCO ensure that the automatic purge and exhaust valve closure times specified in the FSAR can be achieved and, therefore, meet the assumptions used in the safety analysis to ensure that releases through the valves are terminated, such that radiological doses are within the acceptance limit.

The LCO is modified by a Note allowing penetration flow paths with direct access from the containment atmosphere to the outside atmosphere to be unisolated under administrative controls. Administrative controls ensure that 1) appropriate personnel are aware of the open status of the penetration flow path during CORE ALTERATIONS or movement of irradiated fuel assemblies within containment, and 2) specified individuals are designated and readily available to isolate the flow path in the event of a fuel handling accident. *

equipment hatch and

the equipment hatch and at least one door in each airlock are

The containment personnel air lock doors many be open during movement of irradiated fuel in the containment and during CORE ALTERATIONS provided that one door is capable of being closed in the event of a fuel handling accident. Should a fuel handling accident occur inside containment, one personnel air lock door will be closed following an evacuation of containment. the equipment hatch and * *

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. 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 handling recently irradiated fuel (i.e., fuel that has occupied part of a critical reactor core within the previous [X] days) will result in doses that are well within the guideline values specified in 10 CFR 100 even without containment closure capability.] Therefore, under these conditions no requirements are placed on containment penetration status.