FENOC

FirstEnergy Nuclear Operating Company

Perry Nuclear Power Plant
10 Center Road
Perry, Ohio 44081

Guy G. Campbell
Vice President - Nuclear

440-280-5224
Fax: 440-280-8029

March 14, 2002
PY-CEI/NRR-2614L

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Perry Nuclear Power Plant
Docket No. 50-440
License Amendment Request Pursuant to 10 CFR 50.90: Inclined Fuel Transfer System (IFTS)

Ladies and Gentlemen:

Nuclear Regulatory Commission (NRC) review and approval of a License Amendment Request (LAR) for the Perry Nuclear Power Plant (PNPP) is requested. The proposed LAR supplements Amendment 100 (TAC No. MA3486) previously approved by the NRC on February 24, 1999. Amendment 100 revised the PNPP Technical Specifications to permit removal of the Inclined Fuel Transfer System (IFTS) blind flange while Primary Containment operability is required during plant startup, operation or hot shutdown conditions.

The proposed LAR will allow exercising and testing the IFTS prior to the beginning of the refueling outage, thus increasing system reliability and refuel outage efficiency. The proposed LAR does not provide for the movement of fuel. The proposed LAR supplements Amendment 100 by including a time limit on the removal of the IFTS blind flange, providing a requirement to install the upper pool IFTS gate prior to IFTS blind flange removal, and limiting the unbolted configuration of the IFTS blind flange when it is rotated.

The proposed LAR is considered risk-informed, therefore Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment In Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," have been followed. The Clinton Power Station and the River Bend Station have successfully implemented a similar LAR.

Implementation of the proposed LAR is planned for September 2002. Therefore, to support this activity, it is requested that the proposed LAR be approved no later than September 1, 2002.

A001

If you have questions or require additional information, please contact Mr. Gregory A. Dunn, Manager - Regulatory Affairs, at (440) 280-5305.

Very truly yours,

Attachments:

1. Notarized Affidavit
2. An evaluation of the change, including a Summary, Description of the Proposed Change, Background, Technical Analysis, Conclusion, Commitments, and Environmental Consideration
3. IFTS Figures
4. Significant Hazards Consideration
5. Proposed Technical Specification Changes (mark-up)
6. Information copy of Technical Specification Bases (mark-up)

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III
State of Ohio

I, Guy G. Campbell, hereby affirm that (1) I am Vice President - Perry, of the FirstEnergy Nuclear Operating Company, (2) I am duly authorized to execute and file this certification as the duly authorized agent for The Cleveland Electric Illuminating Company, Toledo Edison Company, Ohio Edison Company, and Pennsylvania Power Company, and (3) the statements set forth herein are true and correct to the best of my knowledge, information and belief.

Guy G. Campbell

Subscribed to and affirmed before me, the 14th day of March, 2002

Jane E Mott

JANE E. MOTT
Notary Public, State of Ohio
My Commission Expires Feb. 20, 2005
(Recorded in Lake County)

SUMMARY

License Amendment 100 allowed removal of the Inclined Fuel Transfer System (IFTS) primary Containment boundary blind flange during MODE 1 (Power Operation), MODE 2 (Startup), or MODE 3 (Hot Shutdown). The Nuclear Regulatory Commission (NRC) on February 24, 1999 approved this License Amendment Request (LAR). Prior to this amendment, the IFTS blind flange was only permitted to be removed in MODES 4 (Cold Shutdown) or 5 (Refueling). Removal of the IFTS blind flange before plant shutdown allows maintenance and testing of the IFTS, which can provide a significant refuel outage time savings. Subsequent to receipt of Amendment 100, it was identified that the analysis for this Technical Specification change did not contain the rigor commensurate with the change. As a result, Licensee Event Report (LER) 2001-001, "Potential for Inadequate Suppression Pool Make-Up for the Emergency Core Cooling Systems" was generated and the allowance to remove the IFTS blind flange at power was suspended until this configuration could receive additional evaluation [reference letters dated January 3, 2000 (PY-CEI/NRR-2450L), March 3, 2000 (PY-CEI/NRR-2469L) and February 1, 2001 (PY-CEI/NRR-2541L)]. Subsequent to this LER, at least two other plants, the Clinton Power Station and the River Bend Station, have successfully implemented a similar amendment.

A comprehensive technical evaluation has since been completed to support removal of the blind flange. In support of this evaluation, requirements will be added to the Technical Specifications to install the upper pool IFTS gate and to limit removal of the IFTS blind flange to 60 days per cycle, as well as to limit the unbolted configuration of the IFTS blind flange to 20 hours per 12 month period. These additional restrictions address the technical issues identified in LER 2001-001 and adequately support removal of the IFTS blind flange in MODES 1, 2 or 3. The evaluation conducted included a deterministic as well as probabilistic evaluation in accordance with the guidance in Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis" and RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications." The evaluation showed that temporary removal of the IFTS blind flange during MODES 1, 2 or 3 for a period of 60 days per year is technically supported and the associated risk is insignificant.

The proposed revision to the Technical Specification Surveillance Requirement is for 60 days per cycle. However, for conservatism, the evaluation conducted was based on a period of 60 days per year. Also, it should be noted that the proposed LAR is for IFTS blind flange removal to accommodate testing, maintenance or design modification work on the IFTS prior to a plant outage, and not for the movement of any fuel. In the future, additional evaluations may be performed to justify the movement of new fuel.

Implementation of the proposed LAR is planned for September 2002. This LAR will enable Perry Nuclear Power Plant (PNPP) personnel to conduct maintenance for reliability improvements and fully test the IFTS to support the PNPP's ninth refuel outage. To support this activity, it is requested that the proposed LAR be approved no later than September 1, 2002.

DESCRIPTION OF THE PROPOSED CHANGE

The enclosed LAR supplements Amendment 100 to include a requirement to install the upper pool IFTS gate, and to include a time limit of 60 days per cycle for when the IFTS blind flange is totally removed and the IFTS tube is open. In addition, a time limit is proposed for the unbolted configuration of the IFTS blind flange when it is rotated for removal or re-installation of 20 hours per 12 month period. These restrictions will accommodate testing and maintenance of the IFTS while the plant is in MODES 1, 2 or 3.

Also, to ensure conservative operations, regulatory commitments are made to incorporate other administrative controls, which are discussed later in this LAR. A comprehensive technical evaluation has been completed to support this LAR, which included a deterministic as well as a probabilistic assessment in accordance with NRC approved guidance.

The proposed change adds a Note for the ACTIONS of Technical Specification 3.6.1.1, "Primary Containment-Operating."

The proposed 3.6.1.1 ACTIONS Note is as follows:

> "Applicable Conditions and Required Actions are not required to be entered for the Inclined Fuel Transfer System (IFTS) penetration for up to 20 hours per 12 month period when the IFTS blind flange is unbolted."

The proposed change also modifies Note 4 associated with Technical Specification Surveillance Requirement (SR) 3.6.1.3.4, "Primary Containment Isolation Valves (PCIVs)"

The proposed new wording for Technical Specification SR 3.6.1.3.4, Note 4, is as follows (new wording is underlined):

> "Not required to be met for the Inclined Fuel Transfer System (IFTS) penetration when the associated primary containment blind flange is removed, provided that the Fuel Handling Building fuel transfer pool water level is maintained ≥40 feet, the upper pool IFTS gate is installed, and the IFTS transfer tube drain valve remains closed. The IFTS transfer tube drain valve may be opened under administrative controls. Removal of the IFTS blind flange shall not exceed 60 days per cycle while in MODES 1, 2 or 3."

Additionally, the associated Technical Specification Bases will be revised to explain the bases for these changes. The revision to the Technical Specification Bases will explain that the installation of the upper pool IFTS gate serves to protect the Suppression Pool Make-Up (SPMU) system water inventory. It will also explain that the 60 days is a risk-informed duration, and will clarify that the removal of the IFTS blind flange during MODES 1, 2 and 3 will only be for maintenance and testing of the IFTS and not for transferring fuel. Also, the proposed 20 hour delay for entering the applicable Technical Specification Conditions for an inoperable Containment when the IFTS blind flange is unbolted for removal or re-installation will be explained. The wording for this 20 hour delay Note is modeled after similar Notes in the Technical Specifications. For example, Note 2 for Technical Specification 3.3.6.1, "Primary Containment and Drywell Isolation Instrumentation," Surveillance Requirements, provides a 6 hour delay based on a reliability analysis. The proposed changes to the Bases are included as Attachment 5 to this LAR for information only, since the Bases are not a formal part of the Technical Specifications.

BACKGROUND

To support this LAR, the following is a brief explanation of the IFTS. The LAR letter of August 31, 1998 (PY-CEI/NRR-2300L) for Amendment 100 may also be referred to for a more detailed discussion of the design and operation of the IFTS. Attachment 3 to this LAR includes the same figure (Figure 1) supplied with the Amendment 100 LAR letter for reference regarding the components of the IFTS. Also, for reference, Attachment 3 includes figures depicting the upper Containment and lower Fuel Handling Building pools.

The IFTS is used to transfer fuel, control rods, defective fuel storage containers, and other small items between the Containment and the Fuel Handling Building lower pools by means of a carriage traveling in a transfer tube.

The inclined fuel transfer tube consists of a stainless steel pipe with a 24 inch outside diameter and includes two 24 inch gate valves, two valves for water level control in the transfer tube, two flexible seals, one blind flange, spool piece, reducing spool, and tracks located within the transfer tube. At the upper Containment IFTS pool, the transfer tube connects to the pool penetration and to a sheave box. Connections to the sheave box include a 24 inch flap valve, a vent pipe, cable enclosure pipes, and a fill valve. In the Fuel Handling Building lower pool, the transfer tube connects to a 24 inch gate valve. A four inch drain pipe is located on the transfer tube slightly above the Fuel Handling Building lower pool water level. Within this drain pipe is a motor operated drain valve that is located in the Intermediate Building. This drain valve is used to control draining of the transfer tube to a vented drain tank in the Intermediate Building. A Containment isolation assembly containing a blind flange and a bellows connects the Containment penetration to the tube assembly and provides for Containment isolation. A vent pipe on the sheave box contains a fluid stop and is connected to the Containment ventilation system.

A duration of 60 days was chosen to provide an adequate amount of time for the preparation of the IFTS prior to its critical operation during a refuel outage. A duration of 60 days will provide a sufficient amount of time to conduct preventive maintenance and testing of the system, as well as providing time for training of system operators and the installation and testing of modifications to improve system reliability.

The following briefly summarizes the technical arguments of Amendment 100 provided in the August 31, 1998 letter to the NRC.

In the Amendment 100 LAR safety analysis, it was determined that the IFTS transfer tube did not constitute a potential leakage path during design basis events from the Containment atmosphere to the Fuel Handling Building atmosphere when the blind flange is removed. This is ensured by the addition of a Technical Specification requirement to maintain a minimum Fuel Handling Building water level (≥ 40 feet) when the IFTS blind flange is removed. Also, provided the lower pool gates are removed, control room monitoring exists for the Fuel Handling Building pool level that would detect any change in the IFTS pool water level.

One IFTS evolution was addressed since it could potentially bypass the water seal. This evolution is when the IFTS carriage is lowered to the bottom portion of the transfer tube and the water in the transfer tube is drained to the level of the drain piping. In this configuration the vent pipe, which leads down to the sheave box, connects the Containment Building atmosphere to the fuel transfer tube drain tank in the Intermediate Building via the transfer tube drain piping. To ensure that the transfer tube drain piping can be rapidly isolated, an administrative control was added to stage a designated individual to verify the drain piping is isolated in the event of an accident during IFTS operation in MODES 1, 2 or 3. This designated individual would be in constant communication with the control room. Once the designated individual is notified by the Control Room of the occurrence of an accident, his/her sole responsibility and function would be to ensure the drain valve is closed. Also, to ensure the drain valve's reliability and leak tightness, the drain valve is a primary Containment isolation valve and is tested per the Pump and Valve Inservice Testing Program and the Primary Containment Leakage Rate Testing Program (Technical Specification 5.5.12).

Subsequent to the NRC approval of Amendment 100, the appropriate programs and procedures were updated to include the administrative controls credited in Amendment 100.

To adequately address the issues with Amendment 100, it is necessary to show that removal of the IFTS blind flange in MODES 1, 2 or 3 will not degrade the design basis function of the SPMU system during an accident. Also, it will be shown that the IFTS tube and drain do not degrade the Containment design function for design basis as well as beyond-design-basis events. The issues of seismic integrity and the potential flooding impact for failure of the limiting IFTS components will also be addressed.

TECHNICAL ANALYSIS

The following technical analysis builds on and supplements the technical arguments briefly summarized above that supported Amendment 100. The technical analysis previously reviewed by the NRC in support of Amendment 100 remains valid. The following technical arguments will show that the implementation of the proposed LAR is an acceptable change with insignificant risk.

The following analysis consists of deterministic as well as probabilistic arguments. The four topics addressed for this analysis are:

1. Seismic Integrity
2. Flooding Analysis
3. Suppression Pool Makeup Inventory
4. Containment Reliability (isolation and ultimate pressure capacity)

All of the above topics will be addressed using deterministic arguments. Supplemental probabilistic arguments will also be provided for the following topics: Seismic Integrity, Suppression Pool Makeup Inventory and Containment Reliability.

Deterministic Assessment

Seismic Integrity

For a postulated seismic event (Operating Basis Earthquake and a Safe Shutdown Earthquake), it has been concluded that the IFTS tube stresses are below the ASME/ANSI B31.1 and ASME Code Section III allowables.

As part of the analysis to support Amendment 100, a seismic assessment report was specifically prepared for the motor operated drain valve. This assessment report evaluated experience data to demonstrate the valve would be functional to the extent that it could be electrically or manually closed following a seismic event at Perry. The IFTS drain valve is designed to ANSI B31.1 standards and is seismically supported and qualified and will remain functional to the extent that it can be closed either with the motor operator or with the operator's hand wheel.

Also as part of the implementation of Amendment 100, a design modification was field installed on March 22, 1999, which modified an existing pipe support that serves as a structural anchor to the drain line piping. This modification provides the necessary support for the drain line piping for the dynamic loads anticipated in MODES 1, 2 or 3. The design of the four-inch drain line is structurally adequate, with all pipe stresses within ASME Code Section III allowables.

The concrete pool structure with the liner is designed to Seismic Category I requirements to prevent damage to the stored fuel. Therefore, the seismic design of the fuel pools precludes the need to postulate a catastrophic failure of the entire pool structure.

Seismic considerations regarding the design of the IFTS carriage, winch, sheave box and cable assembly will be included with the Probabilistic Safety Assessment (PSA) arguments presented later in this LAR. Even in the worst case, where the sheave box or the attached IFTS flap valve are assumed to fail and permit water from the upper Containment pool to be drained to the Fuel Handling Building lower pool, the design basis events including the Large Break LOCA are protected by the requirement to install the IFTS gate. Installation of this gate ensures protection of the SPMU water inventory in the pools adjacent to the upper Containment IFTS pool. None of the water in the upper Containment IFTS pool is credited in the SPMU portion of the LOCA analyses.

Lastly, during blind flange removal, and again during re-installation, a temporary condition exists where some of the flange bolts are removed and some are loosened to allow the blind to be removed from its normal position between the flanges. Hydraulic jacks are used to spread the flanges and flange pins assist in maintaining alignment. This unbolted configuration is not formally analyzed for all accident scenarios. The risk is to the IFTS bellows assembly, as exact seismic displacements are not quantified when the blind flange bolts are removed. Therefore, failure of the IFTS bellows is conservatively assumed, which would result in a potential bypass of Containment.

Since the unbolted configuration is not formally qualified, the configuration will be included as part of the PSA arguments that are presented later in this LAR. Also, since an analysis has not been performed for this configuration, the Containment would be considered to be inoperable until the flange bolts are tensioned. This configuration would require entry into the ACTIONS of Limiting Condition for Operation (LCO) 3.6.1.1, "Primary Containment Operating." Since the PSA analysis on the unbolting process shows that this activity is not risk significant if it is limited to a total of 20 hours per year of unbolted time, a new Note is proposed for inclusion into the ACTIONS portion of LCO 3.6.1.1. The new Note states that the "Applicable Conditions and Required Actions are not required to be entered for the Inclined Fuel Transfer System (IFTS) penetration for up to 20 hours per 12 month period when the IFTS blind flange is unbolted." This Note provides a 20 hour delay during removal and re-installation of the blind flange before the Technical Specification ACTIONS are required to be entered when the IFTS blind flange is unbolted in MODES 1, 2 or 3. This is required to conservatively limit the seismic risk associated with the unbolted IFTS flange, yet provides adequate time to complete flange rotation. The Technical Specification Bases will be revised to note that this 20 hour assumption will be maintained by tracking the total number of hours per year that the flange is unbolted.

Flooding Analyses

Review of the IFTS configuration with the blind flange removed reveals that several components (e.g., flap valve, IFTS tube, bottom valve, sheave box, fill valve, vent tube and the drain valve) may serve as a pressure boundary between the upper Containment pools and the Fuel Handling Building lower pools. These IFTS components are not safety related. They have been seismically qualified except for the flap valve and the sheave box.

Failure of one of these components, or receipt of a spurious opening signal during a design basis Loss of Coolant Accident (LOCA), could result in the upper IFTS pool water draining to the Fuel Handling Building lower pools. A large break LOCA and/or a Safe Shutdown Earthquake (SSE) concurrent with failure or receipt of a spurious opening signal of one of these non-safety, non-seismically qualified components will now be addressed.

A conservative flooding analysis has been completed. In this analysis, the upper IFTS tube components fail when the bottom valve is open, permitting water in the upper IFTS pool to drain down to the lower Fuel Transfer pool via the IFTS tube. The duration that the water drains down through the IFTS tube to the Fuel Handling Building was determined assuming no flow resistance. It was assumed that the Fuel Pool Cooling and Cleanup system does not handle the added flow and water ultimately overflows the lower pools. It was also assumed that the gate between the upper IFTS pool and the Dryer Storage/Fuel Storage Pool is installed since this is proposed as a Technical Specification requirement as discussed later in the SPMU inventory discussion of this LAR.

As part of the input to this conservative analysis, a failure of the sheave box was modeled and flow to the drain tanks was not credited. Failure of the sheave box was conservatively modeled by postulating a circular opening equivalent to a hole of approximately 3 inches in diameter.

The pressure at the time of the leak is conservatively assumed to be constant and equal to Containment design pressure of 15 psig plus the static head of the upper pool. The volume of the upper IFTS pool could potentially be up to 51,021 gallons and the normal Fuel Handling Building lower pool water level is approximately 1 foot below the building floor. The flow rate with the postulated failure of the sheave box is approximately 1200 gpm. This leakage rate represents a conservative value since the sheave box is the largest diameter IFTS component of those identified in the pool. Lastly, no credit is taken for entrance losses through the leakage opening or operator action to redirect to the upper pools, flow from the Fuel Handling Building pools.

With the bottom valve considered open, and with a conservative constant flow rate of 1200 gpm, the upper pool will overflow the lower pools in approximately 45 minutes. The overflow results in a maximum flood height of less than 8 inches within the Fuel Handling Building. This flood height is determined by conservatively assuming that there is no water leakage out through any doors. This flood height does not affect the limiting components for flooding in the areas of concern (various elevations of the Fuel Handling Building). These components are Containment isolation valves and an Instrument Air system pressure transmitter, which are located in the Fuel Handling Building at a height greater than 3 feet off the floor.

The postulated flooding is not expected to hinder the efforts of the designated individual credited for Amendment 100, who will have completed the required actions before any water spills from the pool. Also, no criticality concerns exist with new fuel storage and handling in the Fuel Handling Building at the predicted flood level (reference USAR Section 9.1.1.3.1).

In addition, to mitigate any potential flooding, water leakage detection is provided by high water level instrumentation that consists of control room annunciation for the Fuel Handling Building lower pool water level. Based on indications of an increase in lower pool level, this instrumentation can be used indirectly to monitor the upper IFTS pool water level when the IFTS is in service. However, the lower pool gate(s) must be removed to provide this indication. The procedural requirement to remove the lower pool gates will be established as part of the implementation of this LAR. Removal of the gates allows for instrument monitoring of Fuel Handling Building pool level as well as the use of all the lower pool scuppers to mitigate leakage from the upper pool. The flooding analysis has shown that worst case postulated flooding with implementation of the proposed LAR is bounded by that previously analyzed for the affected buildings.

Suppression Pool Makeup Inventory

The SPMU system provides a sufficient volume of water that can be transferred from the upper Containment pools to the Suppression pool after a LOCA. The upper Containment pools provide a makeup supply to support the Emergency Core Cooling System (ECCS) function to cool the reactor vessel.

As previously mentioned, as a result of LER 2001-001, the removal of the IFTS blind flange at power had been suspended pending additional evaluation. Specifically this LER was generated to document that removal of the IFTS blind flange at power could potentially affect the SPMU system's ability to support the ECCS. With the IFTS flange removed at power, and the upper pool IFTS gate removed, the potential existed to drain the upper pool volume, reducing the inventory available to the SPMU system to support make up to the Suppression pool, which supports the ECCS design function during a LOCA. Reduced Suppression pool volume and increased Suppression pool temperature could result in a subsequent loss of suction pressure for the ECCS pumps.

The SPMU system's operation and functions were reviewed in regards to IFTS blind flange removal during MODES 1, 2, or 3. The SPMU system is required in MODES 1, 2, and 3 by Technical Specification 3.6.2.4, "Suppression Pool Makeup (SPMU) System." SPMU system calculations were reviewed to determine the upper pool water inventory needed to maintain the system operable.

The SPMU system relies upon the water inventory from three sources (refer to the figure in Attachment 3, Page 2):

1. The steam Separator Storage pool (water inventory down to the level of the SPMU system piping)
2. The Reactor Cavity (water inventory down to the height of the wall between the separator storage pool and the reactor cavity)
3. The Dryer Storage pool (water inventory down to the height of the wall between the separator storage pool and the reactor cavity, excluding the upper IFTS pool volume).

The upper IFTS tube components (e.g., sheave box, fill valve, flap valve, cable enclosures, vent pipe) that would provide isolation for the upper IFTS pool are non-safety and non-seismic. The integrity of these components need not be considered with respect to protection of SPMU if the upper pool IFTS gate is installed. LER 2001-001 postulated a failure or a receipt of a spurious opening signal for one of these non-safety, non-seismic components. With a requirement to install the IFTS gate, should a failure of IFTS occur, the primary water loss would be from the upper IFTS pool. There would be no effect on the SPMU volume in the upper Containment pools, since gate installation to support this LAR would provide protection against an IFTS component failure and provide single failure protection of upper pool water inventory for supporting the SPMU system. As a result, a requirement to install the upper Containment pool gate between the IFTS pool and the Dryer Storage pool (the upper pool IFTS gate) will be established in the Technical Specifications prior to IFTS blind flange removal during MODES 1, 2 or 3.

The IFTS gate is safety related with a passive "J " seal. The gate is designed to be capable of sealing against the full hydrostatic head and leak less than 50 gpm. The gate seals had not previously been addressed from a service life perspective. Therefore, the integrity of the seals was reviewed to prove their capability to perform under the conditions postulated for this LAR. The gate seals are constructed of Ethylene Propylene Diene Monomer (EPDM).

The material type and material manufacturer for the gate seals is the same for the PNPP's airlock door seals. Based on a comparison review of similar EPDM installed material, the seals of the upper IFTS pool gate would have a service life greater than 40 years with respect to radiation and temperature. The conclusion of this review is that the gate is adequate to protect the SPMU volume with no additional controls or maintenance. However, within the PSA arguments discussed later in this LAR, gross leakage of the upper Containment pools is assumed without the upper IFTS gate installed. Therefore, the gate's function is not important when considering its effect on the risk significance of the proposed LAR.

An additional concern was identified regarding the impact to the SPMU system's required water inventory. There are four piping lines, which connect the IFTS pool to each of the upper Containment pools (IFTS, Reactor Cavity, the Dryer Storage/Fuel Storage pool and the Steam Separator Storage pool). The concern was that through these four lines, if the IFTS pool should begin to drain, water from the other pools could be drained as well.

The lines that lead into the IFTS pool are 1" siphon breaker lines (reference page 2 of Attachment 3). These lines come off of the supply lines into the Reactor Cavity, the Dryer Storage/Fuel Storage pool and the Steam Separator Storage pool. The function of the four 1" siphon breaker lines is to break the vacuum of the Fuel Pool Cooling and Cleanup system supply water piping in the event of a supply pipe failure. Should the supply piping fail at a low elevation outside of the pool, the pump side of the break would discharge to the floor. However the poolside of the break, because of its low elevation would cause reverse flow or siphon of the pool volume through the normal supply to the pool. The safety related, seismic, siphon breaker lines serve to break this vacuum and minimize pool inventory loss, thus providing protection of the SPMU inventory.

The siphon breaker lines terminate in the upper Containment IFTS pool below the required SPMU water level. During a design basis LOCA, with a postulated component failure or a receipt of a spurious opening signal for one of the non-safety, non-seismic IFTS components, the upper IFTS pool would drain and as a result, the other upper Containment pools would potentially drain into the IFTS pool via the siphon breaker lines. This would lower the SPMU's available water inventory and may adversely impact its design function. To address this issue, a modification will be completed to extend the elevation of the affected Fuel Pool Cooling and Cleanup system siphon breaker lines that discharge to the upper IFTS Containment pool to above the minimum required SPMU level. This modification will be completed before the proposed LAR is implemented.

As previously discussed in the flooding analysis, the gates will be removed between the lower IFTS pool and the Fuel Preparation and Storage pool and the Spent Fuel Storage pool to provide adequate annunciation of abnormal pool water level. The pools and their resistance to single failure, the installation of the upper pool IFTS gate, and the removal of the gates in the lower pools to provide control room annunciation of Fuel Handling Building lower pool level, and the modification to extend the siphon breaker termination points above the required SPMU level, provides adequate assurance that the upper pool level is maintained to support the required functions of the SPMU system.

Containment Reliability

Removal of the IFTS blind flange during MODES 1, 2, or 3 primarily affects Containment, its isolation integrity, and the pressure that would be attainable in Containment before it vented to the Fuel Handling Building. The ultimate pressure capacity of the IFTS tube, its drain line, and all drain line components is greater than that of the Containment shell.

The integrity of the IFTS tube and its associated drain line and drain valve have been shown by analysis to meet seismic requirements that will assure these components can easily accommodate the pressure associated with the design basis accident. As part of the implementation of Amendment 100, the motor operated drain valve was added as a primary Containment isolation valve and as such, was added to the Primary Containment Leakage Rate Testing Program and is tested per the Pump and Valve Inservice Testing Program. As previously discussed in the seismic discussion, a seismic assessment report was specifically prepared for the motor operated drain valve, which demonstrated the valve would be functional following a seismic event.

The drain valve is a 4", 150 lb., flanged end, ball valve with a Ramcon electrical actuator and a 0.5 hp motor. If at anytime the remote electrical operation is suspended, valve operation may be administratively controlled using manual valve operation. Thus, even during a loss of power, the valve may be fully opened or closed manually. The drain valve's position will not change upon its electrical power being cycled, i.e., if it is re-energized following a loss of normal offsite power. Therefore, the drain valve logic has been reviewed regarding maintaining Containment integrity under a loss of normal power and the valve remains acceptable to support the proposed LAR.

The function of the primary Containment is to isolate and contain fission products released from the reactor coolant system following a design basis LOCA and to confine the postulated release of radioactive material to within limits. The design basis accident that postulates the maximum release of radioactive material within primary Containment is a large break LOCA.

The large break LOCA will produce a Containment pressure of approximately 7.8 psig. This is known as "Pa," as defined in 10 CFR 50, Appendix J. Pursuant to Amendment 100 LAR, the Technical Specification minimum Fuel Handling Building Fuel Transfer pool water level maintains a backpressure of 9.4 psig. However, the normal and realistic water level, which is about 3' 10" higher than the Technical Specification minimum level, maintains protection up to a Containment pressure of 10.8 psig. Therefore, since water seal integrity is maintained up to Containment pressures of approximately 10 psig, the large break LOCA will not breach the water seal.

For Amendment 100 the large break LOCA was used for evaluating the peak Containment accident pressure, since its radiological effects have the greatest potential for offsite releases. Also, the resulting Pa from a large break LOCA is the required value that the regulations and the Technical Specifications specify for the leak rate testing of valves, penetrations, and the Containment shell. As proven within the technical arguments of Amendment 100, the integrity of the IFTS system with the blind flange removed in MODES 1, 2 or 3 will withstand the pressures and temperatures of the limiting design basis accident LOCA without exceeding Containment design leakage rate.

The only other design basis accident or transient scenario that could be postulated to potentially produce Containment pressures that will challenge the integrity of the IFTS water seal is a small break LOCA. The IFTS water seal would only be challenged if large amounts of Drywell bypass leakage exist. However, in addition to the 10 year Technical Specification surveillance test that limits the allowable leakage to less than 10% of the design basis, additional confirmatory testing is performed at PNPP every cycle (24 months) as a result of commitments from a previous license amendment. Performance of this additional testing enforces an even tighter Drywell leakage limit.

Actual values resulting from Technical Specification surveillance tests have ranged between 0.2% to 4.2% of the design value (reference September 24, 1997 letter from the NRC for Amendment 88, TAC No. M94493).

Maintaining Drywell leakage in this range ensures that the Containment pressures following a small break LOCA would be lower than the IFTS water seal capability.

In addition, in regards to a realistic expectation for Drywell bypass leakage with a small break LOCA, Commitment 18 within the USAR, Appendix 1B, was established related to Amendment 88. This commitment requires a qualitative assessment of Drywell bypass leak tightness once per cycle. This commitment is met by pressurizing the Drywell using air flow from the Combustible Gas Control system compressor, which has a flow capacity of 500 scfm. A calculation is then performed to determine the leak rate with an acceptance limit of 400 scfm. If this leak rate is exceeded, further investigation is required to ensure that the Drywell integrity has not degraded. The acceptance criterion for this assessment is less than 1% of the design allowable Drywell bypass leakage value of approximately 58,000 scfm.

Based on the established requirements within the Technical Specifications and the USAR for Drywell bypass leakage, the expected Containment pressures following a small break LOCA will be far below that required to overcome the IFTS water seal. Therefore, the small break LOCA is not considered the limiting accident and its impact on the proposed LAR is bounded by other events addressed in this LAR (flooding, large break LOCA and Anticipated Transients Without Scram).

Several beyond-design-basis events that may be postulated to exceed the Containment design pressure include Anticipated Transients Without Scram (ATWS) and hydrogen generation events. The current USAR, Table 15C-8, identifies the peak ATWS Containment pressure as 9.6 psig. Although the USAR states that no fuel damage results from this event, the licensed 9.6 psig pressure slightly exceeds that assumed for the analysis provided in Amendment 100 (9.4 psig). Any release from this event through the IFTS pool is therefore considered as potentially impacting the Large Early Release Frequency (LERF), and is addressed in the following PSA analysis.

Regarding hydrogen generation events, there are two degraded core accident scenarios described in the USAR, Section 6.2.8, "Hydrogen Control System". These two beyond design basis events are a stuck open relief valve with failure of ECCS and a Drywell small steam line break, which generate a metal-water reaction involving 75% of the fuel cladding. In the USAR, Table 6.2-46, the maximum Containment pressure for these two events are 21.2 psig and 19.4 psig, respectively. Both of these potentially exceed the water seal pressure capability for the IFTS and are addressed in the LERF portion of the following PSA analysis.

The postulated design basis LOCA pressures will be contained by the IFTS tube. However, as noted above, two beyond design basis events could theoretically exceed the water seal pressure capability. Therefore, as a conservative measure, procedural requirements will be established to require that Fuel Handling Building closure be in effect during periods when the blind flange is removed. The Fuel Handling Area Exhaust ventilation subsystem will assist in filtering Containment bypass flow from the IFTS tube at a Containment pressure of 15 psig. The Fuel Handling Building Area Exhaust subsystem is a once through safety related system that includes charcoal and high efficiency particulate filtration. The ventilation pattern in the area of the Fuel Handling Building lower pools is from the supply around the periphery of the pools toward the exhaust located directly over the pools.

Probabilistic Safety Assessment (PSA)

A PSA analysis was performed assuming a duration of 60 days per year for the IFTS blind flange removal while the plant is in MODES 1, 2 or 3. A duration of 20 hours per year was evaluated for the rotation and restoration of the IFTS blind flange.

The PSA analysis considered the following three topics:

1. Suppression Pool Make-Up Inventory
2. Containment Reliability (isolation and ultimate pressure capacity),
3. Seismic Integrity

Four criteria were used to evaluate the impact to PSA. These four criteria include:

1. The change in the Core Damage Frequency, (CDF)
2. The Incremental Conditional Core Damage Probability (ICCDP)
3. The change in Large Early Release Frequency (LERF)
4. The Incremental Conditional Large Early Release Probability (ICLERP)

The following assumptions were used for the PSA analysis.

1. The IFTS may be placed in operation 60 days per year while the plant is in Modes 1, 2 or 3.

2. During the 60 day IFTS operational period, it is assumed that the carriage will be in one of two configurations. Either the carriage will be in the upper pool with the flap valve open, the drain valve closed and the bottom valve closed, or the carriage will be in the lower position with the drain valve and bottom valve open and the flap valve closed.

3. When not being exercised, the IFTS carriage will be in the up position. Therefore, it is assumed that the IFTS carriage will be in the up position with the flap valve open on average 50 of the 60 days per year of IFTS operation while in Modes 1, 2 or 3. When the plant is in this configuration it is assumed that the drain valve and bottom valve will be closed.

4. It is assumed that the IFTS carriage will be in the lower position with the bottom valve and drain valve open on average 10 of the 60 days per year of IFTS operation while in Modes 1, 2 or 3.

5. Potential leakage paths for the upper Containment pool volume are through the flap valve to sheave box seat (when flap valve is closed) and through the bottom valve or the drain valve when the flap valve is open.

6. Failure of the fill valve while the IFTS carriage is in the lower position was assumed to be an insignificant contributor to drainage of the upper pool and thus an insignificant contributor to CDF. Since the vent tube bypasses the fill valve, failure of the fill valve is not a significant contributor to LERF.

7. The flap valve and the seat to the sheave box are completely bypassed for Containment leakage due to the air vent tube and cable enclosures penetrating the sheave box.

8. The SPMU volume is protected by the installation of the upper pool IFTS gate. SPMU is not credited with the volume in the IFTS pool. For this evaluation, however, it is conservatively assumed that the IFTS gate will be removed during IFTS operation when the plant is in Modes 1, 2 or 3. With the gate removed, excessive leakage past the IFTS isolation valves is assumed to lower the SPMU volume, failing the SPMU function.

9. Failure of the IFTS drain valve during IFTS operation and failure of the designated individual to close the valve, coincident with a core damage event was assumed to result in a Containment bypass. If an early release resulted from the event it was categorized as a large early release. The actual LERF for this condition would be much less than computed since a significant fraction of the proposed Containment bypasses would involve a scrubbed release through the Suppression pool. A scrubbed release would not be considered a large release.

10. During removal and re-installation of the blind flange, a temporary condition will exist where the bolting will be loosened, hydraulic jacks will spread the flange faces, and approximately one half of the bolts will be removed while the blind is rotated. This condition is expected to exist for no more than 10 hours for each blind removal or re-installation (total less than 20 hours per 12 month period during Modes 1, 2 or 3). With the bolts removed, seismic restraint is potentially challenged. The risk is to the bellows assembly, as exact displacements are not quantified. Failure of the ASME Class 2 bellows would result in a potential bypass of Containment.

11. The force resulting from the upper Containment pool hydraulic pressure on the flap valve is greater than the hydraulic force exerted by the flap valve actuator. Therefore, the flap valve will not be capable of opening once the tube begins draining following flap valve closure.

12. It is assumed that a seismic event less than an Operating Basis Earthquake (OBE), 0.075g, would not result in the loss of offsite power to the plant or the loss of any seismically qualified equipment. It is also assumed that a seismic event with a magnitude greater than an OBE would result in a loss of offsite power. Only qualified equipment (i.e., Emergency Core Cooling Systems) is assumed to be available for mitigating an OBE.

13. It is assumed that a seismic event with a magnitude greater than a Review Level Earthquake (RLE) at 0.30g results in the loss of qualified equipment, leading to core damage and a large early release. It is also assumed that the probability of core damage is less than 1.0 for seismic events that are weaker than a RLE.

This evaluation is bounding in that conservative assumptions have resulted in consequences greater than would realistically be expected. Nonetheless, the conclusion is that the increase in the CDF and LERF risk associated with the proposed amendment is insignificant.

Suppression Pool Makeup Inventory

As previously discussed, a loss of water from the upper Containment pool through IFTS could result in a reduced volume of makeup to the Suppression pool from the SPMU system. This could have an impact on the CDF and the ICCDP. Reduced Suppression pool volume and increased Suppression pool temperature could result in a subsequent loss of required net positive suction head for the ECCS pumps for some ATWS scenarios. It is important to note that in the PNPP PSA, it is not necessary to credit the SPMU system for LOCA scenarios.

The impact on the CDF for ATWS events was evaluated by considering a failure (excessive leakage or spurious operation) of the bottom gate valve or the IFTS drain valve while the flap valve and upper isolation valve are open. Failure of either the drain valve or bottom gate valve was assumed to sufficiently drain the upper Containment pools, degrading the performance of SPMU. The manual valve in series with the drain valve or the installation of the upper pool IFTS gate was not credited for this analysis.

The failure rate used for each of the two valves (drain and bottom) is conservatively assumed to be 5.0E-07/hour. Note that NUREG/CR-2728, "Interim Reliability Evaluation Program Procedures Guide," January 1983, suggests a lower failure rate of 1.0E-07/hour for spurious operation of a motor operated valve. Conservatively assuming that the flap valve would be open during 50 days of the 60 day period, the failure probability for each valve is 6.0E-04. It was also assumed that gross leakage from the flap valve, while the bottom gate valve and drain valve were open, would sufficiently drain the upper pools to degrade the SPMU system. Again a failure rate of 5.0E-07/hour was assumed with an exposure time of 10 days of the 60-day period for this configuration.

The failure mechanisms result in a CDF of 5.907E-06/reactor-year. Note the PNPP baseline CDF is 5.904E-06/reactor-year. The quantified increase in CDF due to the proposed amendment is 3.0E-09/reactor-year. This meets the acceptance guideline (an increase in CDF of less than 1.0E-06) for consideration per RG 1.174.

The conditional CDF while the IFTS blind flange is removed was computed to be 5.915E-06/ reactor-year. Using an exposure of 60 days per year the ICCDP for this configuration is 1.8E-09. This reflects the impact of the proposed amendment on the core damage probability taking into account the maximum time exposure (60 days) that would be allowed by the amendment. The computed ICCDP is less than the guideline value of 5.0E-07 given in RG 1.177 for a single Technical Specification change.

Containment Reliability

New potential release paths are created when the blind flange is removed. The paths are from the upper Containment via the vent tube through either the IFTS bottom valve and Spent Fuel Storage pool, or the IFTS drain line isolation valve and drain tank. This could have an impact on the LERF and ICLERP. To evaluate these release paths the following three configurations were analyzed.

1) <u>Releases via the Bottom Valve with Flap Valve Open (Carriage in Upper Position)</u>

Containment isolation for this path is provided by the IFTS bottom gate valve and the IFTS water seal in the Spent Fuel Storage pool. Potential mechanisms leading to a release via the bottom gate valve are: over pressure failure of the IFTS tube, inadvertent operation of the bottom valve combined with clearing and displacement of the water seal, or excessive leakage of the bottom valve with clearing and displacement of the water seal.

After the blind flange is removed, any leakage through the bottom valve would result in a gradual transfer of water from the upper Containment pool to the Fuel Handling Building Spent Fuel Storage pools. An increase in the Spent Fuel Storage pool level would result from any bottom valve leakage. A significant increase in the Spent Fuel Storage pool level would be detected in the control room by annunciators. It is reasonable to expect that excessive leakage of the IFTS bottom gate valve would be readily identified and isolated.

Pursuant to Amendment 100, given a failure of the bottom valve, the water seal will continue to maintain a leak-tight barrier to a release of fission products up to a Containment pressure of approximately 10 psig. For greater Containment pressures the pressure inside the IFTS tube will exceed the hydrostatic pressure at the bottom valve outlet and a release into the Fuel Handling Building lower pool could occur. If excessive leakage of the bottom valve were to occur and go undetected, an atmospheric release from the upper Containment airspace through the IFTS bottom valve could result from a core damage event.

Fission products from such a release, however, would receive significant scrubbing by the overlying water in the Fuel Handling Building lower pools. Additional fission product scrubbing by the water in the Suppression pool or Containment sprays may also occur before the fission products would reach the upper Containment. Therefore, releases via the bottom isoiation valve are not characterized as large releases.

2) Releases via the Drain Valve with Flap Valve Open (Carriage in Upper Position)

Containment isolation for this path is provided by the drain line motor operated valve that will be maintained in accordance with the primary Containment leakage rate testing program. Potential failure modes that may lead to a release via the IFTS drain line are: excessive leakage of the drain line isolation valve, over-pressure failure of the isolation valve, or inadvertent operation or failure to manually close the isolation valve.

The IFTS drain line isolation valve is leak tested prior to removal of the blind flange and is tested per the Pump and Valve Inservice Testing Program. However, failure of the valve or inadvertent opening of the valve would introduce a potential release mode that could bypass Containment given a core damage event. Therefore, an inadvertent opening of the isolation valve plus failure of the designated individual to close the isolation valve were added to the Level 2 PRA evaluation. A value of 5.0E-07/hour was used for the failure rate of an inadvertent opening of the isolation valve. Referencing NUREG/CR-1278, "Handbook of Human Reliability Analysis with Emphasis on Nuclear Power Plant Applications," a conservative value of 0.01 per demand was used for failure of the designated individual to close the valve.

All occurrences of an open drain line or failure of the bottom IFTS isolation valve with the blind flange removed, coincident with a core damage event were assumed to result in a bypass of the Containment. For this evaluation, the configuration with the carriage in the upper position is assumed to be in effect, on average, for 50 days each year.

3) Vent Tube Release Path with Flap Valve Closed (Carriage in Lower Position)

With the blind flange removed and the flap valve closed the bottom isolation valve and the drain valve would typically be open. With the open IFTS vent tube, a potential Containment bypass exists. Fission products released past the bottom valve into the Fuel Storage pool would be scrubbed; however, releases through the drain valve would not.

For the purpose of this evaluation it is assumed that a core damage event with the blind flange removed and the flap valve closed would result in a bypass of the Containment if the designated individual fails to close the drain valve. As stated above, a failure rate of 0.01 per demand was used for the failure of the dedicated operator to close the drain valve, during an exposure window of 10 days per year with the carriage in the lower position.

Resulting LERF and ICLERP Calculation

The increase in LERF due to the above-described configurations was modeled and quantified. With the carriage in the upper position, the drain line is the pathway that can contribute to LERF, since any releases from the bottom valve are scrubbed and therefore are not considered to be large releases. For this drain line, a Containment bypass was assumed if a drain line isolation failure occurred either at the time of the initiating event, or within 24 hours following an initiating event. Likewise, a Containment bypass was assumed when the carriage is in the lower position and the designated individual does not isolate the drain valve.

The failure rate used for the operator action to isolate the drain valve is 0.01 per demand. A factor of 0.5 was used to estimate the time of IFTS operation prior to the initiating event (e.g. the average duration with the flap valve open prior to an initiating event would be 25 days). The 0.5 factor is reasonable based on the assumption that an initiating event has an equal probability of occurring at any time during operation of IFTS.

The increase in LERF from the baseline LERF of 3.5E-07, assuming the additional probability of a Containment bypass as proposed above, is computed to be 2.5E-07/reactor-year. Since the quantified LERF computed for plant operation in the configuration proposed by the amendment is 6.0E-07/reactor-year, and since this value is less than 1.0E-05/reactor-year, the calculated increase in LERF is within the range for consideration of the amendment per Regulatory Guide acceptance criteria. This results in an ICLERP associated with IFTS operation of 4.1E-08. In accordance with RG 1.177, an ICLERP less than 5.0E-08 demonstrates that the proposed technical specification amendment would have a small quantitative impact on risk.

Containment Ultimate Pressure Capacity

The ultimate pressure capacity of the IFTS tube, drain line and drain line components is greater than that of the Containment shell. The Containment Ultimate Capability Analysis Final Report attached to PNPP letter dated February 11, 1985 (PY-CEI/NRR-0131L), states the following: "The capacity of the general shell to resist statically applied pressure is determined to be 78.0 psig based upon the lower bound vessel strength and 94.0 psig based upon the mean value vessel strength."

The IFTS tube has a 24 inch outer diameter (D) and a wall thickness (t) of ½ inch. The IFTS tube is assessed at 100 psig, which envelops the Containment upper limit of 94 psig. The hoop stress at 100 psig (P) is PD/2t or 2400 psi. This stress is very small in comparison to that in the Containment shell (ultimate capacity) which would result from the same pressure. Also, due to size, the drain line stresses will be even smaller.

It is therefore concluded that the IFTS tube and drain line has pressure capacity greater than the Containment. More simply put, the Containment will be the weaker link from a pressure failure perspective. Therefore, the impact of the IFTS transfer tube and connected piping on the ultimate pressure capacity of the Containment and LERF is considered to be negligible.

Seismic Integrity

The IFTS tube is classified as Seismic Category I. Modifications to the drain line required to adequately support the line have been completed and an evaluation of the line has shown that it is seismically qualified.

The primary impact of seismic events is during the removal and re-installation of the blind flange when the flange bolting is de-tensioned. It was conservatively assumed that during the 10 hours when the blind flange is being removed and again during the 10 hours when the flange is being re-installed (20 hour total duration) a seismic event could potentially fail the bellows assembly.

For the purpose of determining equipment availability, offsite power is assumed to be lost following a seismic event greater than or equal to an OBE, 0.075g seismic event, and assumed to be available for events less than an OBE. It is assumed that an OBE would be required to initiate a reactor scram and fail the bellows when the flange bolting is de-tensioned.

From NUREG-1488, "Revised Livermore Seismic Hazard Estimates for Sixty-Nine Nuclear Power Plant Sites East of the Rocky Mountains," the mean frequency for a 0.075g seismic event can be interpolated to be 2.5E-04. Likewise, from EPRI report NP-6395-D, "Probabilistic Seismic Hazard Evaluations at Nuclear Plant Sites in the Central and Eastern United States: Resolution of the Charleston Earthquake Issue," dated April 1989, a mean frequency of 1.8E-04/year can be interpolated for the Perry site. Using the larger of these two seismic frequencies, the mean probability of a 0.075g seismic event occurring during the removal or re-installation of the flange is computed to be 5.7E-07. The conditional core damage frequency for a Loss Of Offsite Power (LOOP) event where offsite power is not recovered and only ECCS is available for mitigating the event is computed to be 3.9E-04/event.

Note that non-qualified systems such as Feedwater were not credited for this event because the seismic event is assumed to fail the non-qualified equipment. Given these assumptions, the ICCDP for a 0.075g or greater seismic event during the removal or installation of the flange is 2.2E-10. Assuming all core damage events with IFTS isolation failed would progress to a large early release, the ICLERP would also be 2.2E-10.

To bound the effect of a seismic event, the Individual Plant Examination of External Events (IPEEE) demonstrated with a high degree of confidence that the Perry site, while in a normal operating configuration, could withstand a Review Level Earthquake (RLE) (0.30g seismic event). That is, for seismic events greater than an OBE but less than or equal to a RLE, the consequences would be the same as those assumed for the OBE above (e.g. LOOP and only ECCS available for mitigation). An event greater than a RLE is assumed to fail all mitigating equipment. It is also assumed that a seismic event greater than 0.30g would result in core damage and a large early release. Again using NUREG-1488 and EPRI report NP-6395-D, the frequency of a 0.30g or greater seismic event at Perry can be interpolated to be 1.9E-05/year and 1.2E-05/year respectively.

Using the larger NUREG frequency, the probability of a 0.30g seismic event occurring during the removal or re-installation of the blind flange is 4.3E-08. Since the ICCDP and the ICLERP for a RLE event is less than 5.0E-08, it can be concluded the contribution due to a seismic event during the removal or re-installation of the blind flange is non-risk significant. Therefore, the plant would not be exposed to a significant risk due to a seismic event during the removal or installation of the blind flange.

Probabilistic Safety Assessment Conclusion

The CDF risk increase related to the implementation of Amendment 100 is tied to the impact of IFTS operation on the SPMU system. With the IFTS gate installed, the impact on SPMU and the CDF is essentially non-existent since SPMU does not credit the volume of water in the upper IFTS pool. This PSA analysis however, conservatively assumed that the upper pool IFTS gate was not installed. The CDF increase for this configuration with the IFTS gate removed is 3.0E-09/reactor-year. This increase in CDF is below the RG 1.174 criteria of 1.0E-06/reactor-year for categorizing the increased risk associated with a plant change as insignificant. Likewise, the ICCDP for the configuration with the upper pool IFTS gate removed is 1.8E-09. In accordance with RG 1.177, this ICCDP value demonstrates that the proposed LAR has only a small quantitative impact on plant CDF risk.

The LERF risk increase for the proposed amendment is associated with the potential of a different means of bypassing the Containment following a core damage event. From the Electric Power Research Institute's "PSA Applications Guide," (EPRI TR-105396) dated August 1995, the definition of a "Large" release is defined as a rapid, unscrubbed release of airborne fission products to the environment.

The majority of accident sequences involve a scrubbed release through the Suppression pool or scrubbing by the Containment sprays. A significant fraction of the bypass sequences postulated during IFTS operation would also entail a scrubbed release through the Fuel Handling Building lower pools. For this analysis, however, it was assumed that all isolation failures of IFTS prior to or during a core damage event would result in a bypass of the Containment. Given this conservative assumption, the increase in LERF due to implementation of the proposed amendment is 2.5E-07/reactor-year. As specified in RG 1.174, an ICCDP less than 5.0E-07 demonstrates that the proposed amendment has only a small quantitative impact on plant CDF risk. The ICLERP, given the above assumptions, is 4.1E-08.

In accordance with RG 1.177, this ICLERP demonstrates that the proposed amendment would have a small quantitative impact on LERF. Implementation of the proposed amendment also would not have a substantial impact on the ultimate pressure capacity of the Containment as it relates to LERF nor would it have a substantial impact on LERF from seismic events. The primary impact of seismic events is during the removal and re-installation of the blind flange when the flange bolting is de-tensioned. Using 20 hours per year for this duration, the bounding ICLERP for a RLE was estimated to be 4.3E-08.

CONCLUSION

A comprehensive technical evaluation has been completed to support supplementing Amendment 100 with a time limit of 60 days per cycle to the associated Technical Specification Surveillance Requirement. The proposed supplemental amendment will allow removal of the IFTS blind flange in MODES 1, 2 and 3 for up to 60 days per cycle for testing and maintenance to support scheduled refuel outages. It also will require the upper pool IFTS gate to be installed and will limit the period the flange can be unbolted to 20 hours per year. The technical evaluation included a deterministic as well as probabilistic assessment in accordance with NRC endorsed guidance (RG 1.174 and RG 1.177). The evaluation showed that temporary removal of the IFTS blind flange during MODES 1, 2 or 3 for a period of 60 days per year is technically justified and the associated risk is insignificant.

COMMITMENTS

The following items are considered to be regulatory commitments. Any other actions discussed in this document represent intended or planned actions, are described for the NRC's information, and are not regulatory commitments. Please notify the Manager - Regulatory Affairs at the Perry Nuclear Power Plant of any questions regarding this document or any associated regulatory commitments.

1. Procedures will be revised to add a prerequisite for IFTS blind flange removal in MODES 1, 2, or 3 to require the gates removed between the lower IFTS pool and the Fuel Preparation and Storage pool and the Spent Fuel Storage pool to provide adequate annunciation of abnormal pool water level.

2. Procedure requirements will be established to require that Fuel Handling Building closure be in effect during periods when the blind flange is removed. This requirement will ensure that the Fuel Handling Area Exhaust subsystem is in operation during periods when the blind flange is removed in MODES 1, 2 or 3.

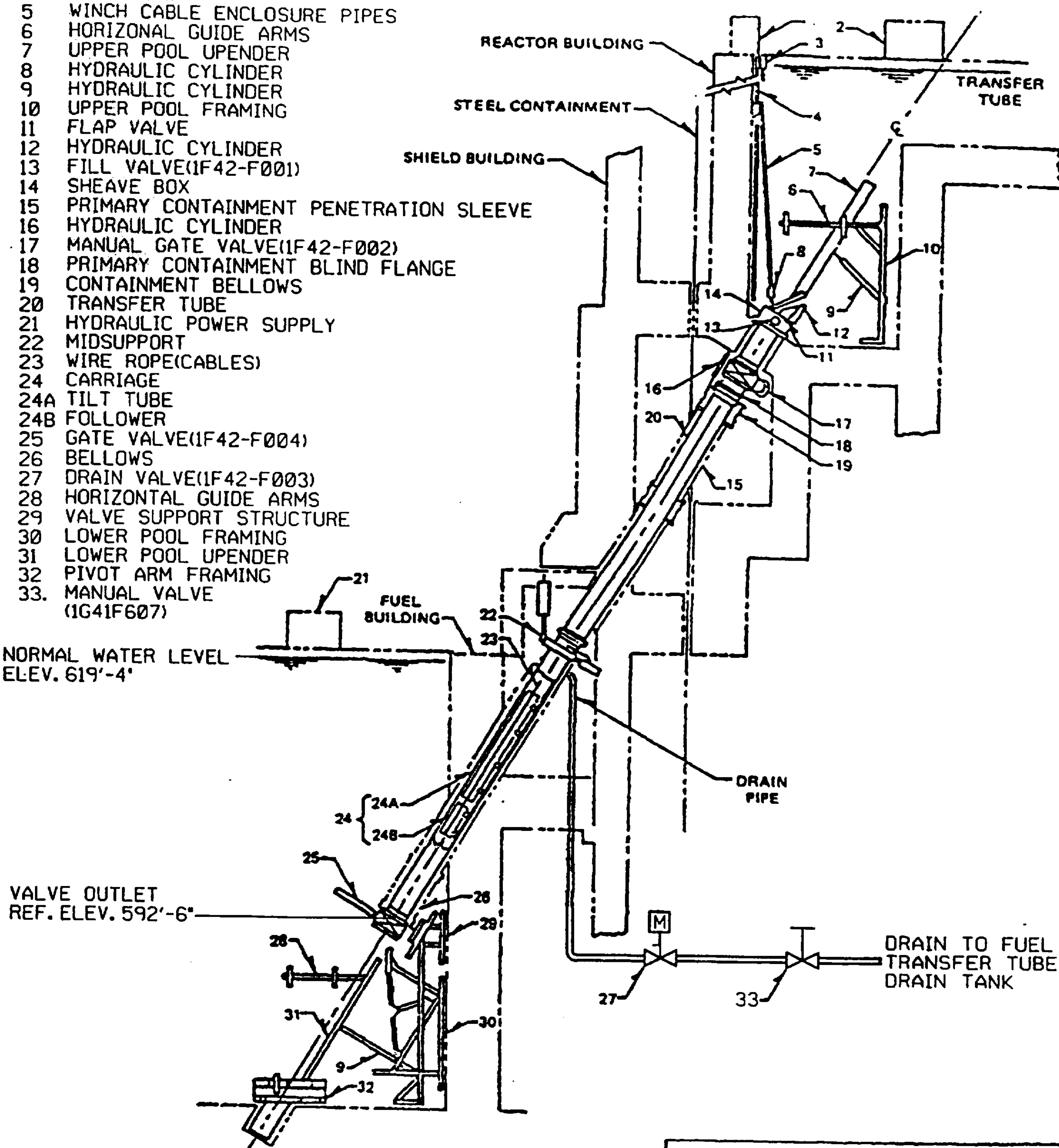
3. A modification will be completed to extend the elevation of the affected Fuel Pool Cooling and Cleanup system siphon breaker lines that discharge to the upper IFTS Containment pool to above the minimum required SPMU level. This modification will be completed before the proposed LAR is implemented.

ENVIRONMENTAL CONSIDERATION

The proposed Technical Specification change request was evaluated against the criteria of 10 CFR 51.22 for environmental considerations. The proposed change does not significantly increase individual or cumulative occupational radiation exposures, does not significantly change the types or significantly increase the amounts of effluents that may be released off-site and, as discussed in Attachment 4, does not involve a significant hazards consideration. Based on the foregoing, it has been concluded that the proposed Technical Specification change meets the criteria given in 10 CFR 51.22(c)(9) for categorical exclusion from the requirement for an Environmental Impact Statement.

INCLINED FUEL TRANSFER SYSTEM

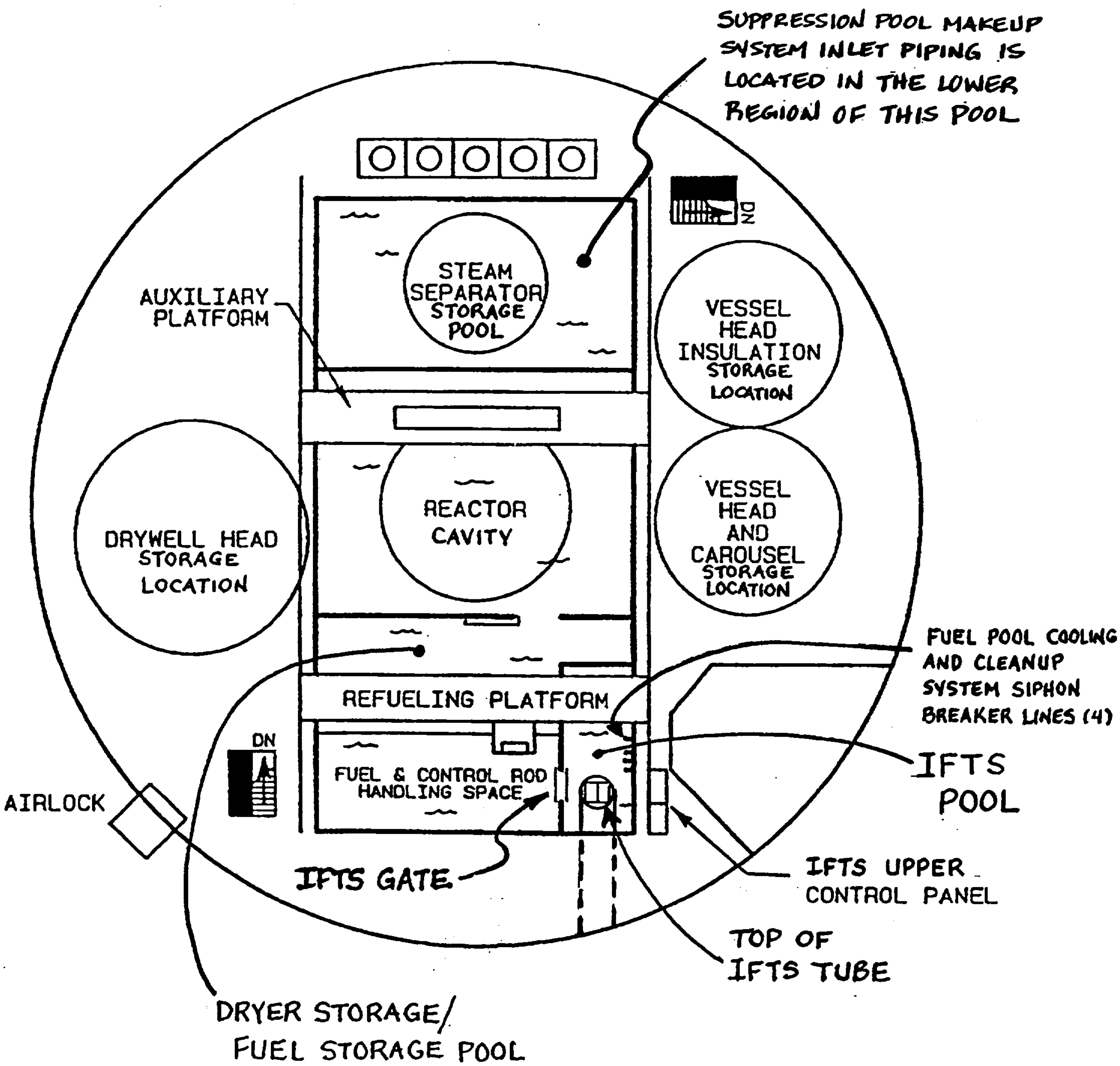
1 WINCH
2 HYDRAULIC POWER SUPPLY
3 FLUID STOP
4 VENT PIPE
5 WINCH CABLE ENCLOSURE PIPES
6 HORIZONAL GUIDE ARMS
7 UPPER POOL UPENDER
8 HYDRAULIC CYLINDER
9 HYDRAULIC CYLINDER
10 UPPER POOL FRAMING
11 FLAP VALVE
12 HYDRAULIC CYLINDER
13 FILL VALVE(1F42-F001)
14 SHEAVE BOX
15 PRIMARY CONTAINMENT PENETRATION SLEEVE
16 HYDRAULIC CYLINDER
17 MANUAL GATE VALVE(1F42-F002)
18 PRIMARY CONTAINMENT BLIND FLANGE
19 CONTAINMENT BELLOWS
20 TRANSFER TUBE
21 HYDRAULIC POWER SUPPLY
22 MIDSUPPORT
23 WIRE ROPE(CABLES)
24 CARRIAGE
24A TILT TUBE
24B FOLLOWER
25 GATE VALVE(1F42-F004)
26 BELLOWS
27 DRAIN VALVE(1F42-F003)
28 HORIZONTAL GUIDE ARMS
29 VALVE SUPPORT STRUCTURE
30 LOWER POOL FRAMING
31 LOWER POOL UPENDER
32 PIVOT ARM FRAMING
33. MANUAL VALVE (1G41F607)



PERRY NUCLEAR POWER PLANT
THE CLEVELAND ELECTRIC
ILLUMINATING COMPANY

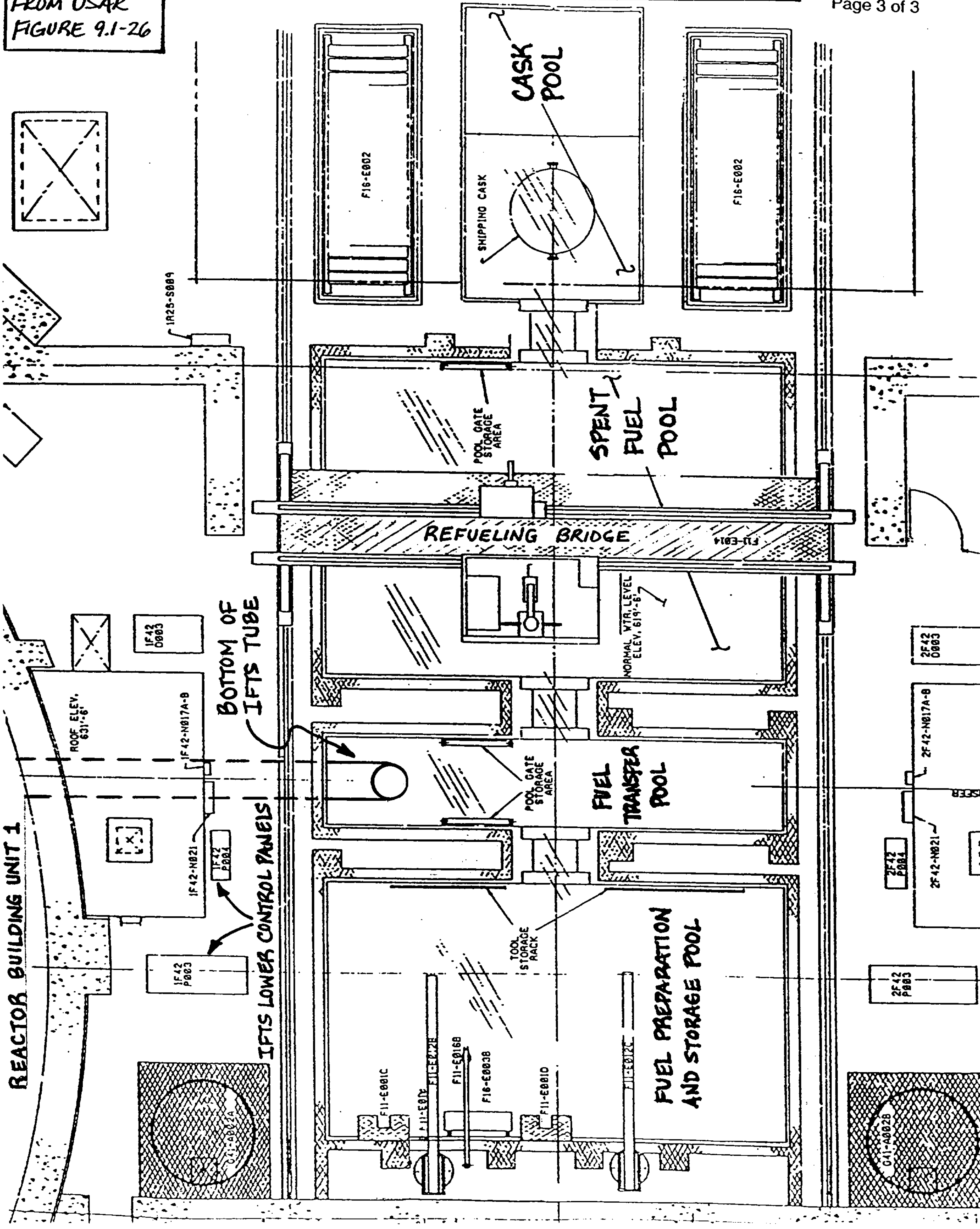
Transfer Tube
(FROM USAR Figure 9.1-19)

UPPER CONTAINMENT POOLS



FUEL HANDLING BUILDING LOWER POOLS

FROM USAR FIGURE 9.1-26



SIGNIFICANT HAZARDS CONSIDERATION

The standards used to arrive at a determination that a request for amendment involves no significant hazards considerations are included in the Commission's Regulation, 10 CFR 50.92, which states that the operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any previously evaluated; or (3) involve a significant reduction in the margin of safety.

The proposed amendment has been reviewed with respect to these three factors and it has been determined that the proposed change does not involve a significant hazard because:

1. The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

   The proposed change permits removal of the Inclined Fuel Transfer System (IFTS) blind flange for a maximum duration of 60 days per cycle when primary Containment operability is required in MODES 1 (Power Operation), 2 (Startup), or 3 (Hot Shutdown). The proposed change also limits the duration the IFTS blind flange may be unbolted when in MODES 1, 2 or 3. The proposed change does not involve modifications to plant systems or design parameters that could contribute to the initiation of any accidents previously evaluated.

   Regarding the probability and consequences of design basis and beyond design basis accidents, a comprehensive technical evaluation was completed in accordance with Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis" and RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications." This evaluation determined that the proposed change is technically justified and the associated risk is insignificant.

   The proposed change permits alteration of the containment boundary for the IFTS penetration. Regarding the consequences of accidents, the proposed change has been determined via a probabilistic risk assessment to be acceptable regarding its overall impact to the plant's risk, consistent with the Nuclear Regulatory Commission's Safety Goal Policy Statement. The resulting pressures and temperatures from a design basis Loss Of Coolant Accident (LOCA) are considered the primary challenge to the integrity of the containment. Pursuant to Amendment 100, the existing Technical Specifications require maintaining an adequate water seal to prevent leakage from the bottom of the IFTS transfer tube and isolating the drain piping. This water seal is adequate to mitigate the effects of the design basis peak post-accident pressures and temperatures. The proposed change requires the installation of the upper IFTS pool gate to provide protection of the Suppression Pool Make Up system water inventory. A time limit for IFTS blind flange removal of 60 days per cycle and a 20 hour limit for the unbolted configuration of the IFTS flange have been established as conservative measures to limit the associated risk to the containment boundary for all accident conditions. The proposed change has been found to be acceptable regarding flooding and seismic design issues.

   Therefore, the function of the containment to provide an adequate boundary in the event of a design basis LOCA is not compromised with the proposed change and the proposed change does not result in a significant increase in the probability or the consequences of previously evaluated accidents.

2. The proposed changes would not create the possibility of a new or different kind of accident from any previously analyzed.

   The proposed change consists of the removal of the IFTS blind flange when in MODES 1, 2 or 3. The IFTS blind flange is a passive component that is not part of the primary reactor coolant pressure boundary and is not involved in the operation or shutdown of the reactor. Being passive, its presence or absence does not affect any of the parameters or conditions that could contribute to the initiation of any incidents or accidents that are created from a loss of coolant or positive reactivity incident. Re-aligning the boundary of the primary containment to include portions of the IFTS is passive in nature and therefore has no influence on the possibility of creating a new or different kind of accident. Furthermore, operation of IFTS is unrelated to the operation of the reactor and there is no mishap in the process that can lead or contribute to the possibility of losing any coolant in the reactor or introducing the chance for positive or negative reactivity or other accidents different from and not bounded by those previously evaluated.

   Therefore, the proposed change does not result in creating the possibility of a new or different kind of accident from any accident previously evaluated.

3. The proposed changes do not involve a significant reduction in a margin of safety.

   The proposed change involves the re-alignment of the primary containment boundary by removing the IFTS blind flange, which is a passive component. The margin of safety that has the potential of being impacted by the proposed change involves the dose consequences of postulated accidents, which are directly related to potential leakage through the primary containment boundary. The potential leakage pathways due to the proposed change have been reviewed, and leakage can only occur from the administratively controlled IFTS transfer tube drain piping. Pursuant to Amendment 100, an individual is currently designated to provide timely isolation of this drain piping when this proposed change is in effect. The conservatively calculated dose, which might be received by the designated individual while isolating the drain piping, is well within the guidelines of General Design Criterion 19. Furthermore the drain piping isolation valve is included in the Primary Containment Leakage Rate Testing Program to ensure that leakage from the piping and components located outboard of the blind flange will be maintained consistent with the leakage rate assumptions of the accident analysis. It has been determined that the proposed change would not have a substantial impact on the ultimate pressure capacity of the containment as it relates to the Large Early Release Frequency (LERF) nor would it have a substantial impact on LERF from seismic events. Therefore, the dose consequences of an event would be unchanged, and the associated margin of safety would also be unchanged.

   Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above considerations, it is concluded that a significant hazard would not be introduced as a result of this proposed change.

MARKED-UP

TECHNICAL SPECIFICATION PAGES

REFLECTING THE PROPOSED AMENDMENT

3.6 CONTAINMENT SYSTEMS

3.6.1.1 Primary Containment—Operating

LCO 3.6.1.1 Primary containment shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

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

---------- NOTE ----------

Applicable Conditions and Required Actions are not required to be entered for the Inclined Fuel Transfer System (IFTS) penetration for up to 20 hours per 12 month period when the IFTS blind flange is unbolted.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.1.3.4	-------------------NOTES------------------- 1. Only required to be met in MODES 1, 2, and 3. 2. Valves and blind flanges in high radiation areas may be verified by use of administrative means. 3. Not required to be met for PCIVs that are open under administrative controls. 4. Not required to be met for the Inclined Fuel Transfer System (IFTS) penetration when the associated primary containment blind flange is removed, provided that the Fuel Handling Building Fuel Transfer Pool *, the upper pool IFTS gate is installed,* water level is maintained ≥40' and the IFTS transfer tube drain valve remains closed. The IFTS transfer tube drain valve may be opened under administrative controls. *Removal of the IFTS blind flange shall not exceed 60 days per cycle while in MODES 1, 2 or 3.* --- Verify each primary containment isolation manual valve and blind flange that is located inside primary containment, drywell, or steam tunnel and is required to be closed during accident conditions is closed.	Prior to entering MODE 2 or 3 from MODE 4, if not performed within the previous 92 days

(continued)

MARKED-UP

TECHNICAL SPECIFICATION BASES PAGES

REFLECTING THE PROPOSED AMENDMENT

(For Information Only)

LCO

Primary containment OPERABILITY is maintained by limiting leakage to < 1.0 L_a, except prior to the first unit startup after performing a required leakage test in accordance with the Primary Containment Leakage Rate Testing Program. At this time, the applicable leakage limits must be met. Compliance with this LCO will ensure a primary containment configuration, including the equipment hatch, that is structurally sound and that will limit leakage to those leakage rates assumed in the safety analysis. Individual leakage rates specified for the primary containment air locks are addressed in LCO 3.6.1.2.

APPLICABILITY

In MODES 1, 2, and 3, a DBA could cause a release of radioactive material to primary containment. In MODES 4 and 5, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Therefore, primary containment leakage limits are not required to be met in MODES 4 and 5 to prevent leakage of radioactive material from primary containment. (refer to LCO 3.6.1.10, "Primary Containment-Shutdown").

ACTIONS

INSERT 1

A.1

In the event that primary containment is inoperable, primary containment must be restored to OPERABLE status within 1 hour. The 1 hour Completion Time provides a period of time to correct the problem that is commensurate with the importance of maintaining primary containment OPERABILITY during MODES 1, 2, and 3. This time period also ensures that the probability of an accident (requiring primary containment OPERABILITY) occurring during periods when primary containment is inoperable is minimal.

B.1 and B.2

If primary containment cannot be restored to OPERABLE status within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

(continued)

BASES

REFERENCES (continued)

6. PNPP Safety Evaluation Report Supplement 7, Section 6.2.6 "Containment Leakage Testing," November 1985.
7. Letter from NRC (T. Colburn) to CEI (A. Kaplan), "Exemption from 10 CFR Part 50, Appendix J", dated January 22, 1988.
8. Letter from NRC (J. Hopkins) to Centerior Services Company (D. Shelton), "Issuance of Exemption from the Requirements of 10 CFR Part 50, Appendix J - Perry Nuclear Power Plant, Unit 1", dated December 4, 1995.

INSERT 2

INSERT 1 - TO TS BASES PAGE B 3.6-3:

A Note has been provided to indicate that when the Inclined Fuel Transfer System (IFTS) blind flange is unbolted for removal or re-installation, entry into associated Conditions and Required Actions may be delayed for up to 20 hours per 12 month period. This note only applies to the IFTS penetration and not to any other Primary Containment penetration. During removal and re-installation of the blind flange, a temporary condition will exist where the bolting will be loosened, hydraulic jacks will spread the flange faces, and normally about one half of the bolts will be removed while the blind is rotated. This condition is expected to exist for no more than 20 hours (10 hours to rotate out the blind and an additional ten hours to re-install the blind). Upon expiration of the 20 hour allowance for this maintenance activity, if the IFTS blind flange has not yet been re-bolted, the applicable Condition must be entered and the Required Actions taken. With the bolts removed, the seismic restraint for the IFTS penetration is potentially challenged. The risk is to the bellows assembly, as exact displacements are not quantified. Failure of the ASME Class 2 bellows could result in a potential bypass of Containment. This Note is based on a risk analysis (Ref. 9) of the time required to perform IFTS blind flange removal or installation. That analysis demonstrated that a 20 hour allowance per 12 month period does not significantly reduce the probability that the Primary Containment will be OPERABLE when necessary. Therefore, the total number of hours that the blind flange is unbolted per 12 month period shall be tracked to ensure the 20 hour assumption in the risk analysis is maintained. The 20 hour duration conservatively limits the seismic risk associated with the unbolted IFTS flange, yet provides adequate time to complete flange rotation.

INSERT 2 - TO TS BASES PAGE B 3.6-6:

9. Letter PY-CEI/NRR-2614L, "License Amendment Request Pursuant to 10 CFR 50.90: Inclined Fuel Transfer System (IFTS)," March 14, 2002.

BASES

SURVEILLANCE REQUIREMENT

SR 3.6.1.3.3 (continued)

verified to be in the proper position, is low. A third Note is included to clarify that PCIVs open under administrative controls are not required to meet the SR during the time the PCIVs are open.

SR 3.6.1.3.4

This SR verifies that each primary containment isolation manual valve and blind flange located inside primary containment, drywell, or steam tunnel, and required to be closed during accident conditions, is closed. The SR helps to ensure that post accident leakage of radioactive fluids or gases outside the primary containment boundary is within design limits. For devices inside primary containment, drywell, or steam tunnel, the Frequency of "prior to entering MODE 2 or 3 from MODE 4, if not performed within the previous 92 days," is appropriate since these devices are operated under administrative controls and the probability of their misalignment is low.

Four Notes are added to this SR. Note 1 provides an exception to meeting this SR in MODES other than MODES 1, 2, and 3. When not operating in MODES 1, 2, or 3, the primary containment boundary, including verification that required penetration flow paths are isolated, is addressed by LCO 3.6.1.10, "Primary Containment- Shutdown" (SR 3.6.1.10.1). The second Note allows valves and blind flanges located in high radiation areas to be verified by use of administrative means. Allowing verification by administrative means is considered acceptable, since access to these areas is typically restricted during MODES 1, 2, and 3 for ALARA reasons. Therefore, the probability of misalignment of these isolation devices, once they have been verified to be in their proper position, is low. A third Note is included to clarify that PCIVs that are open under administrative controls are not required to meet the SR during the time that the PCIVs are open.

A fourth Note addresses removal of the Inclined Fuel Transfer System (IFTS) blind flange in MODES 1, 2, and 3. [delete] INSERT 3
[delete] ~~Requiring~~ the Fuel Handling Building Fuel Transfer Pool water level to be ≥ 40' above the bottom of the pool, [Add which] ensures sufficient submergence of water over the bottom gate valve in the transfer tube to prevent direct communication between the Containment Building atmosphere and the Fuel

(continued)

SURVEILLANCE REQUIREMENT

SR 3.6.1.3.4 (continued)

Handling Building atmosphere, even upon occurrence of the peak post-accident pressure, P_a. Forty feet (40') above the bottom of the pool is equivalent to 22' 8 ¼" above the top of the flange for the IFTS bottom gate valve, which is approximately 3' 10" more water than needed to counteract the peak accident pressure of 7.8 psig. Also, since the IFTS drain piping does not have the same water seal as the transfer tube, administrative controls are required to ensure that the drain flow path can be quickly isolated whenever necessary.

These controls consist of designating an individual, whenever the 1F42-F003 valve is to be opened with the blind flange removed in MODE 1, 2, or 3, to be responsible for verifying closure of the valve if an accident occurs. This designated individual will remain in continuous communication with the control room, and be located at the 620' elevation in the Fuel Handling Area of the Intermediate Building. This person will be in addition to the minimum shift crew composition required to be at the plant site. Once the designated person is notified by the control room of the occurrence of an accident, his only assigned function will be to close this valve. The designated individual will verify the valve is closed from the controls at the IFTS panel if they are available. If this is not successful, the valve will be closed manually at the valve location. The designated person will be equipped with portable lighting (e.g., a flashlight) to supplement emergency lighting.

Also, the drain piping motor-operated isolation valve is tested in accordance with the Primary Containment Leak Rate Test Program. The leakage rate on this valve will be controlled by the strict limits on potential secondary containment bypass leakage (SR 3.6.1.3.9). Thus, the combination of water seal in the Fuel Handling Building pressure integrity of the IFTS transfer tube, and administrative controls ~~on the motor operated drain valve in the drain piping,~~ creates ~~an~~ acceptable barrier against post-accident leakage to the environment.

SR 3.6.1.3.5

Verifying the isolation time of each power operated and each automatic PCIV is within limits is required to demonstrate OPERABILITY. MSIVs may be excluded from this SR since MSIV

(continued)

<u>INSERT 3</u> - TO TS BASES PAGE B 3.6-28:

for up to 60 days per cycle. The 60 days per operating cycle is a risk-informed duration that provides the option of performing testing and maintenance of the IFTS during MODES 1, 2 or 3 prior to an outage. However, it is not meant for the movement of fuel. Removal of the IFTS blind flange during MODES 1, 2 or 3 requires the upper pool IFTS gate to be installed and requires...

<u>INSERT 4</u> - TO TS BASES PAGE B 3.6-28a:

The upper Containment pool gates between the fuel transfer pool and the dryer storage pool is required to be installed prior to IFTS blind flange removal during MODES 1, 2 or 3. With these gates installed, should a failure of IFTS occur, only the upper fuel transfer pool and any volume over the gates will drain. Installing the upper pool IFTS gate provides single failure protection of upper pool water inventory for supporting the SPMU system. If the IFTS gate was not installed, the potential would exist to drain the upper pool volume, reducing the inventory available to the SPMU system to support make up to the suppression pool, which supports the ECCS design function during a LOCA. Reduced suppression pool volume and increased suppression pool temperature could result in a subsequent loss of suction pressure for the ECCS.

Additional administrative controls are required prior to the removal of the IFTS blind flange in MODES 1, 2 or 3. These prerequisite administrative controls are 1) the lower fuel transfer pool gates must be removed, and 2) the Fuel Handling Area exhaust subsystem must be in operation. Removal of the lower fuel transfer pool gates ensures control room monitoring exists for spent fuel pool level, which would assist in detecting a change in the fuel transfer pool water level in the event of an IFTS component failure. In addition, as a conservative measure, Fuel Handling Building closure shall be in effect during IFTS blind flange removal activities during MODES 1, 2 or 3. This requirement ensures that the Fuel Handling Area exhaust subsystem is in operation.