

# License Amendment Request for Drain Down of Upper Containment Pool (UCP) in MODE 3

FirstEnergy Nuclear Operating Company  
Perry Nuclear Power Plant

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# FENOC Representatives

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# Agenda

- **Meeting Objective**
- **Need for Amendment**
- **Background**
- **Supporting Analyses**
- **Proposed Technical Specification Changes**
- **Technical Evaluation**
- **Regulatory Evaluation**
- **Schedule**
- **Questions**

# Meeting Objective

- **Present information to NRC staff describing a proposed License Amendment Request (LAR) for the Perry Nuclear Power Plant (PNPP).**
- **Answer questions from the NRC staff on the proposed LAR approach and obtain feedback from NRC staff on the proposed LAR content.**
- **Identify the schedule associated with the LAR for its use in Perry's 16<sup>th</sup> refueling outage.**

# Need for Amendment

- **The purpose of the proposed amendment is to allow certain outage-related activities to occur while in MODE 3.**
  - Installation of UCP reactor cavity to steam dryer storage pool gate (MODE 1, 2, and 3).
  - Drain down of the reactor cavity pool (MODE 3).
- **Currently these activities are restricted to MODE 4**
- **This Amendment will reduce critical path refueling time.**

# Background

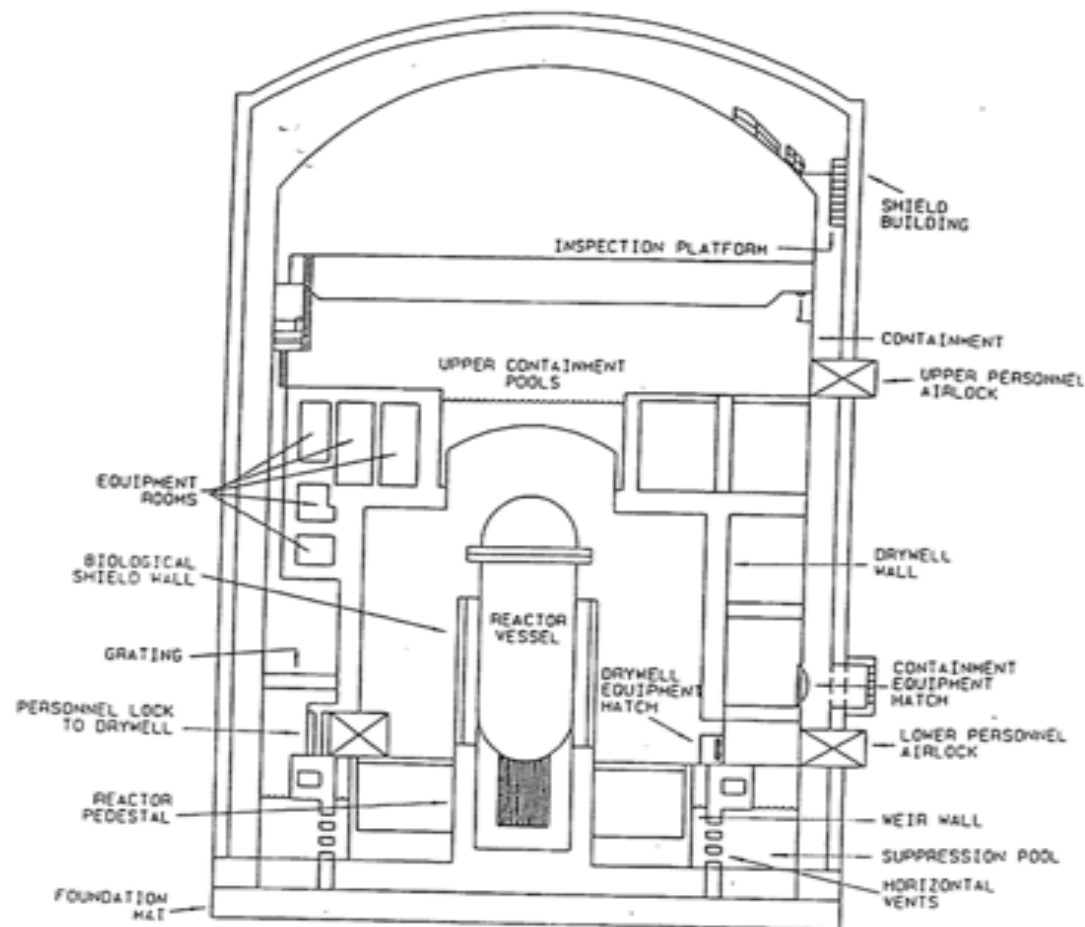


FIGURE T23-1  
REACTOR CONTAINMENT SYSTEM

INFORMATION ONLY

# Background

- **The Suppression Pool provides makeup water to the Reactor Pressure Vessel (RPV) in the event of a LOCA.**
- **Design Basis for the Suppression Pool includes**
  - Maintaining 2 foot water coverage above horizontal vents
  - Providing adequate NPSH for the ECCS pumps
- **The Suppression Pool Makeup (SPMU) System provides makeup inventory to the Suppression Pool during a LOCA via gravity flow from the UCP.**
- **The water level limits in the UCP and Suppression Pool are governed by PNPP Technical Specifications (TS).**

# Background

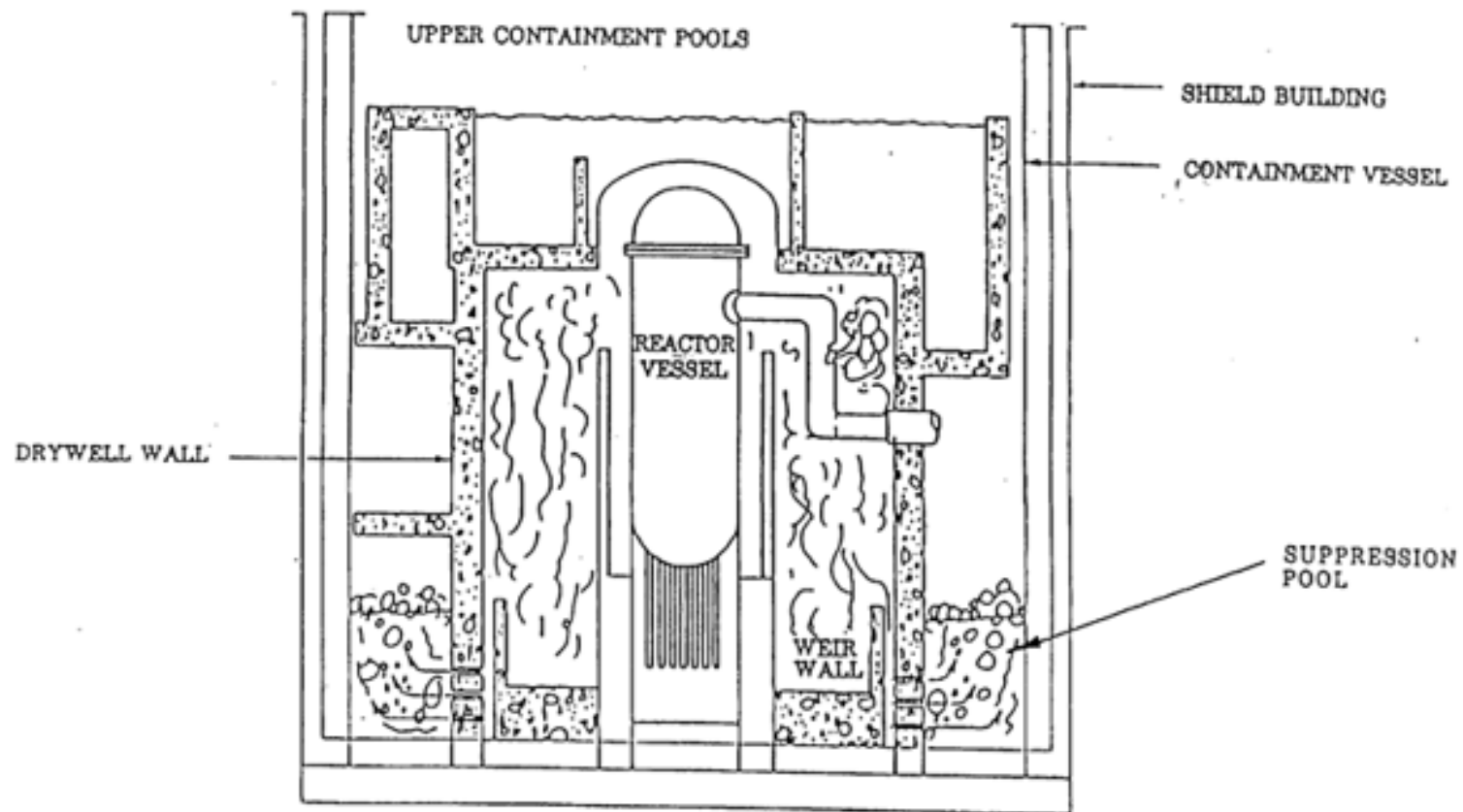


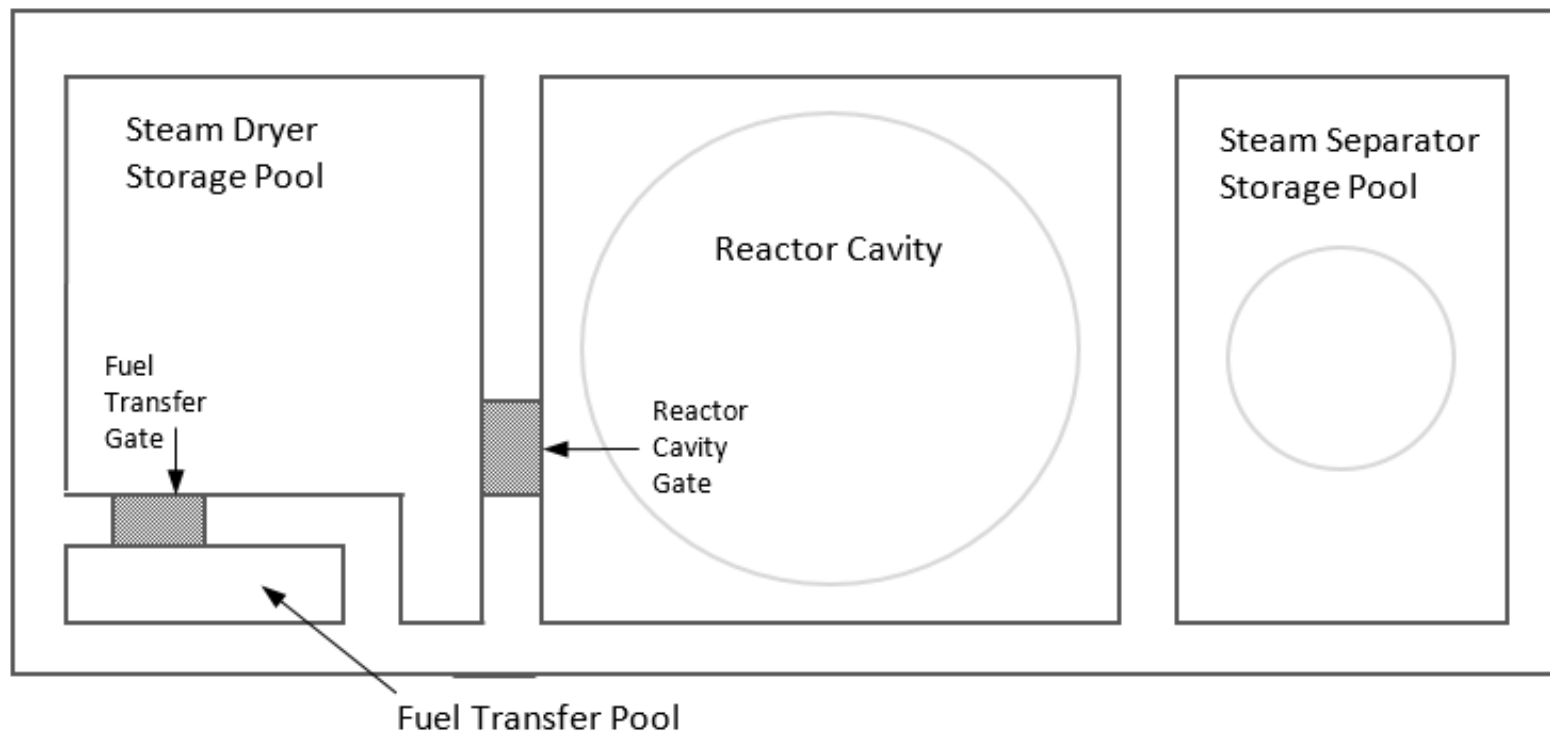
Figure T23-2  
REACTOR CONTAINMENT SYSTEM FLOWPATH

INFORMATION ONLY



# Background

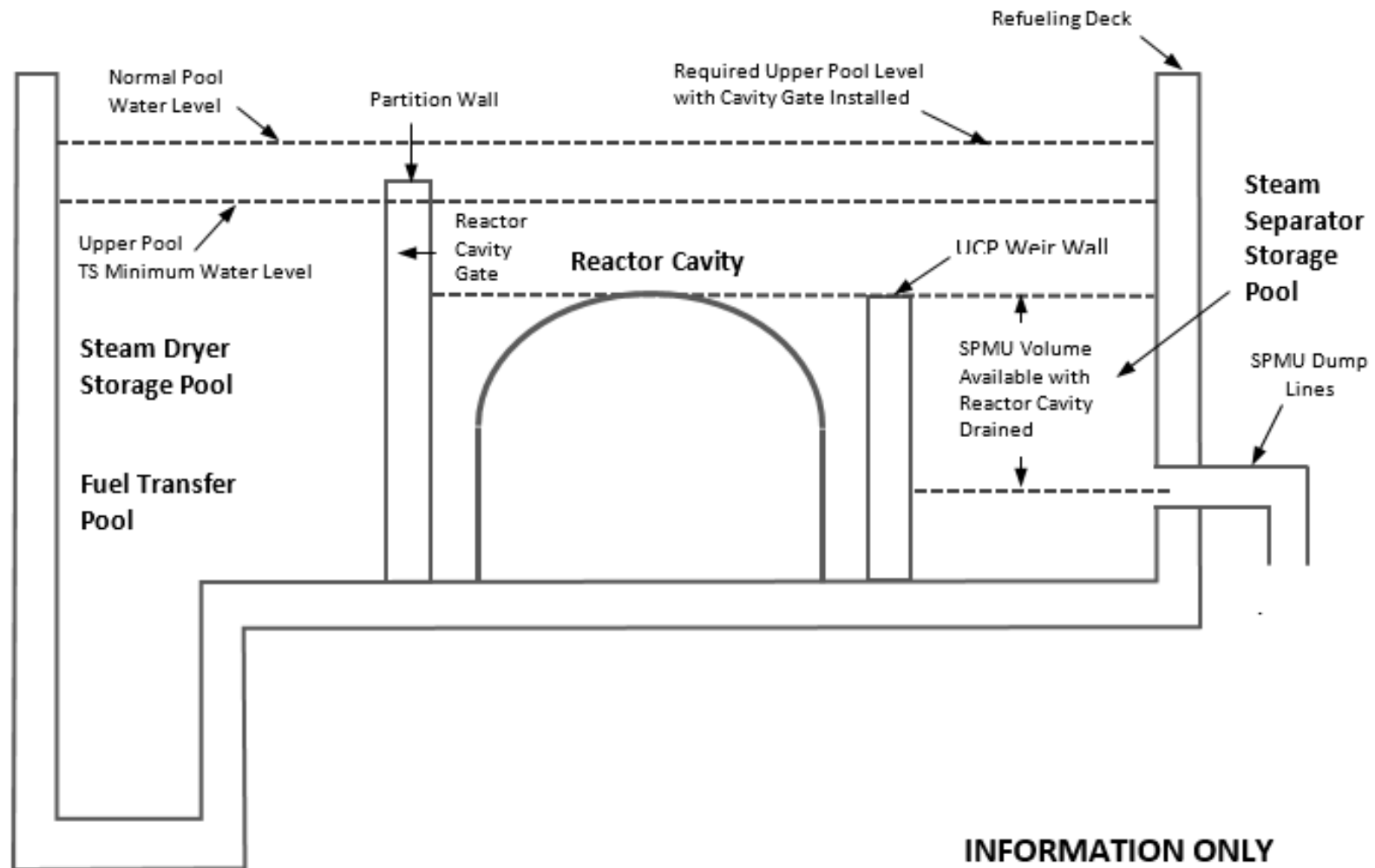
## Upper Containment Pool – Plan View



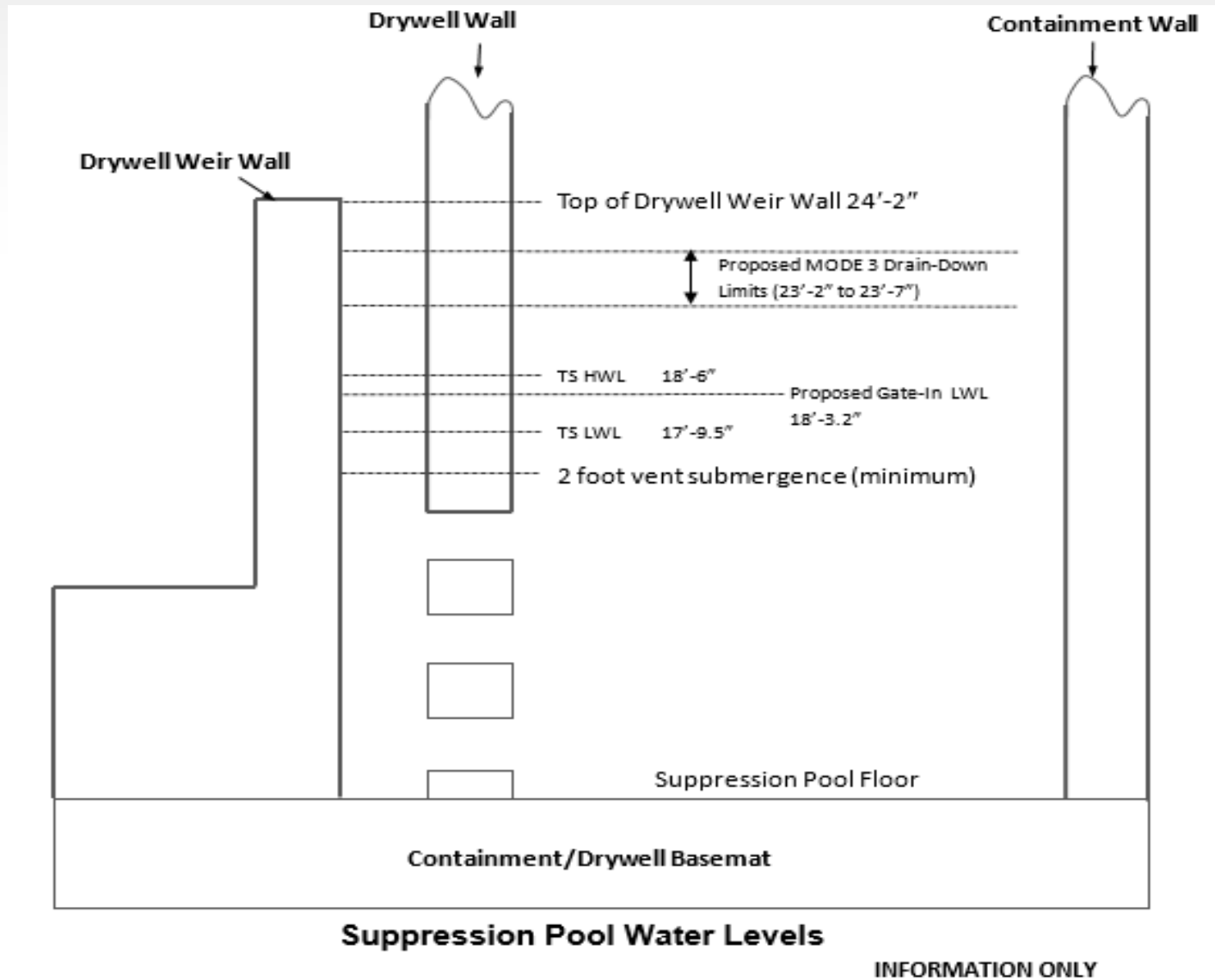
**INFORMATION ONLY**

# Background

## Upper Containment Pool – Elevation View



# Background



# Supporting Analyses

- **Analyses have been performed to evaluate:**

- UCP gate installation in MODES 1, 2, and 3.
- Drain down of the Reactor Cavity Pool in MODE 3 (with RPV pressure at 230 psig).

- **Impact of the UCP gate installation in MODES 1, 2, and 3.**

- UCP water level needs to be maintained at the normal UCP water level (which is above the current TS minimum level).
- Suppression pool water level needs to be raised (within current TS operating band)

- **Impact of the Reactor Cavity Pool drain down in MODE 3 (with RPV pressure at 230 psig).**

- Suppression Pool water level needs to be raised above the current TS HWL limit.

# Proposed Technical Specification Changes

## ■ TS 3.6.2.2 “Suppression Pool Water Level”

### 3.6.2.2 Suppression Pool Water Level

LCO 3.6.2.2      Corrected suppression pool water level shall be  $\geq 17$  ft 9.5 inches and  $\leq 18$  ft 6 inches, when the reactor well to steam dryer storage pool gate is not installed,

OR

Corrected suppression pool water level shall be  $\geq 18$  ft 3.2 inches and  $\leq 18$  ft 6 inches, when the reactor well to steam dryer storage pool gate is installed.

APPLICABILITY:      MODES 1, 2, and 3.

# Proposed Technical Specification Changes

## ■ TS 3.6.2.4 “Suppression Pool Makeup (SPMU) System”

### SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.2.4.1	<p>Verify upper containment pool water level is:</p> <p>a. <math>\geq 22</math> ft 9 inches above the reactor pressure vessel (RPV) flange, when the reactor well to steam dryer storage pool gate is not installed.</p> <p><u>OR</u></p> <p>b. <math>\geq 22</math> ft 5 inches above the RPV flange, and suppression pool water level <math>\geq 17</math> ft 11.7 inches, when the reactor well to steam dryer storage pool gate is not installed.</p> <p><u>OR</u></p> <p>c. <math>\geq 23</math> ft 0 inches above the RPV flange and the suppression pool water level <math>\geq 18</math> ft 3.2 inches, when the reactor well to steam dryer storage pool gate is installed.</p>	24 hours

# Proposed Technical Specification Changes

## ■ TS 3.6.2.4 “Suppression Pool Makeup (SPMU) System”

### SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.2.4.4	<p>-----NOTE-----</p> <p>The requirements of this SR are not required to be met when all upper containment pool levels are maintained per SR 3.6.2.4.1.c and suppression pool water level is maintained <math>\geq 18</math> ft 3.2 inches, no work is being performed that has the potential to drain the upper fuel transfer pool, IFTS carriage is located in the upper pool, and IFTS transfer tube shutoff valve 1F42F002 is closed.</p> <p>Verify all required upper containment pool gates are in the stored position or are otherwise removed from the upper containment pool.</p>	31 days

# Proposed Technical Specification Changes

## ■ Add new Special Operations TS 3.10.9 “Suppression Pool Makeup – MODE 3 Upper Containment Pool Drain Down”

### 3.10 SPECIAL OPERATIONS

#### 3.10.9 Suppression Pool Makeup – MODE 3 Upper Containment Pool Drain Down

- LCO 3.10.9      The requirements of LCO 3.6.2.2, “Suppression Pool Water Level” and LCO 3.6.4.2, “Suppression Pool Makeup (SPMU) System,” may be suspended in MODE 3 to allow drain down of the Upper Containment Pool, provided the following requirements are met:
- a.    Suppression Pool Average Temperature is  $\leq 110^{\circ}\text{F}$ ;
  - b.    Suppression Pool and Upper Containment Pool water levels are maintained within limits of Figure 3.10.9-1;
  - c.    The steam dryer storage pool and the fuel transfer (IFTS) pool areas of the Upper Containment Pool are maintained at a minimum of 22 ft 8 inches above the RPV flange;
  - d.    Reactor Steam Dome pressure is  $\leq 230$  PSIG;



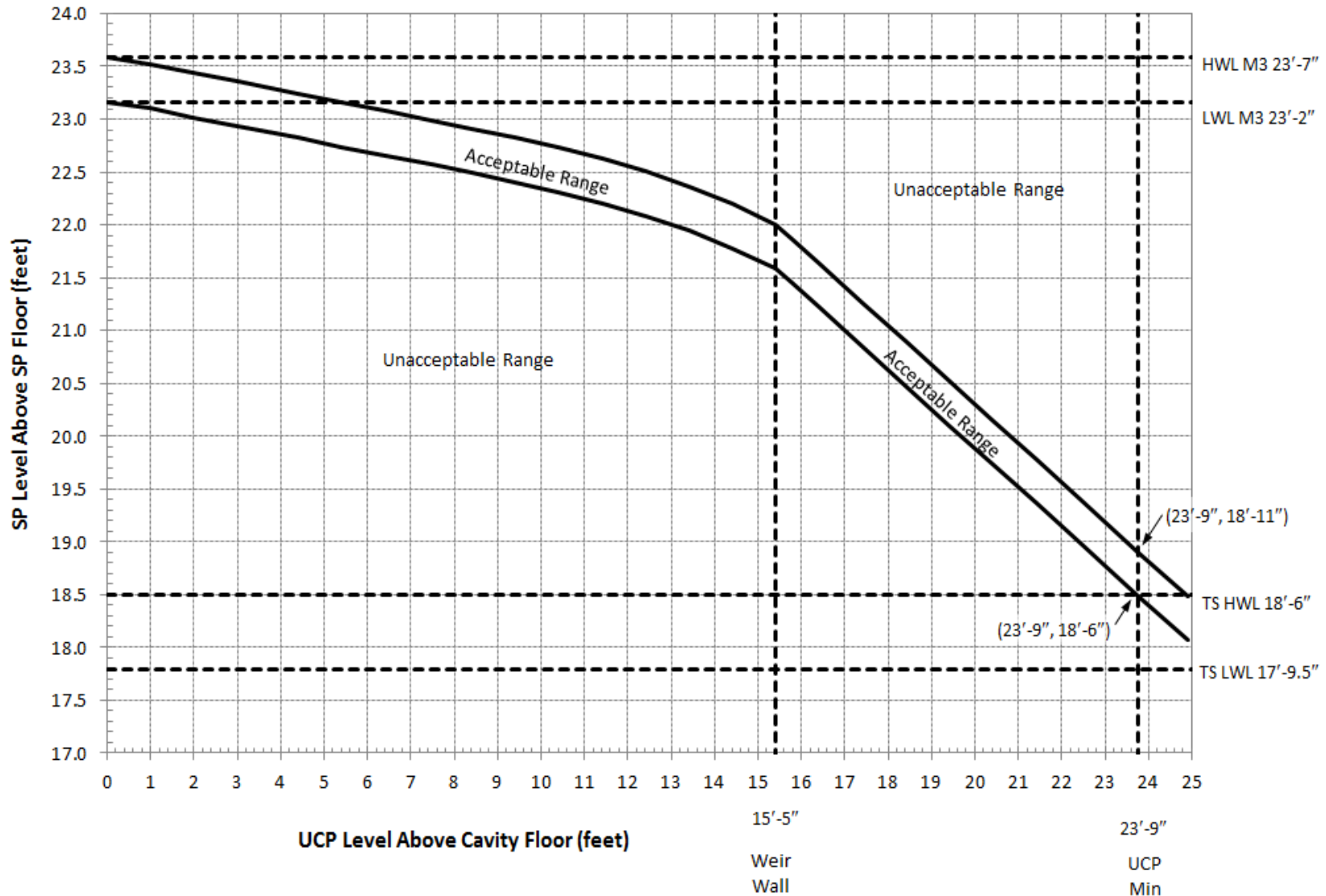
# Proposed Technical Specification Changes

## ■ Add new Special Operations TS 3.10.9 “Suppression Pool Makeup – MODE 3 Upper Containment Pool Drain Down” (continued)

- e. Reactor has been subcritical  $\geq 2$  hours;
- f. Each SPMU subsystem valve is OPERABLE in accordance with SR 3.6.2.4.3 and SR 3.6.2.4.5 and Upper Containment Pool temperature is in compliance with SR 3.6.2.4.2;
- g. No work is being performed that has the potential to drain the upper fuel transfer pool;
- h. IFTS carriage is located in the upper pool;
- i. IFTS transfer tube shutoff valve 1F42F002 is closed; and
- j. Reactor well to steam dryer storage pool gate is installed.

APPLICABILITY: MODE 3 with LCO 3.6.2.2 and 3.6.2.4 not met.

# Proposed Technical Specification Changes



# Technical Evaluation

- **Containment Response Using GOTHIC Computer Code**
- **Post-Accident Vent Coverage**
  - With UCP gate installed (MODES 1, 2, 3)
  - With UCP reactor cavity fully drained (MODE 3)
  - During UCP drain down evolution (TS figure developed)
- **ECCS NPSH Requirements**
- **Long-Term Heat Sink**
- **Personnel and LOCA Dose Evaluation**
- **Steam Line Break with Steam Bypass of Suppression Pool**

# Technical Evaluation

## ■ Hydrodynamic Loads

- Water Jet Loads
- LOCA Air Bubble Loads
- Pool Swell Drag and Impact Loads
- Fallback Loads
- Froth Impingement and Drag Loads
- Condensation Oscillation Loads
- Chugging Loads
- Drywell Depressurization Loads

# Technical Evaluation

## ■ Miscellaneous Considerations

- Potential Drywell Flooding with Inadvertent UCP Dump
- UCP Dump Time versus SP Pump Time Criterion
- Evaluation of IFTS Blind Flange Removal During MODE 3 Drain Down Activity

# Regulatory Evaluation

- **No Significant Hazards Consideration**
  
- **Applicable Regulatory Requirements/Criteria**
  - GDC 4 “Environmental and Dynamic Effects Design Bases”
  - GDC 16 “Containment Design”
  - GDC 38 “Containment Heat Removal”
  - GDC 50 “Containment Design Basis”

# Regulatory Evaluation

## ■ Precedent

- Grand Gulf Nuclear Station
- Clinton Power Station

## ■ Environmental Consideration

# Schedule

## ■ Schedule

- Approval requested in advance of Perry Refuel Outage 1R16



Questions

# Questions?