January 5, 2017

MEMORANDUM TO: David J. Wrona, Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Operation

FROM: Eric R. Oesterle, Chief **/RA/**
Reactor Systems Branch
Division of Safety System
Office of Nuclear Reactor Regulation

SUBJECT: SAFETY EVALUATION REPORT - APPLICATION FOR AMENDMENT PERRY NUCLEAR POWER PLANT. THE PROPOSED LICENSE AMENDMENT REVISES THE PERRY NUCLEAR POWER PLANT TECHNICAL SPECIFICATIONS FOR UPPER CONTAINMENT POOL GATE INSTALLATION IN MODES 1, 2, AND 3, AND DRAIN-DOWN OF REACTOR CAVITY PORTION OF THE UPPER CONTAINMENT POOL IN MODE 3 (TAC NO. MF7476)

By letter dated March 15, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16075A411), FirstEnergy Nuclear Operating Company (FENOC, the licensee) submitted a License Amendment Request (LAR) for the Perry Nuclear Power Plant (PNPP). The proposed license amendment revises the PNPP Technical Specifications for Upper Containment Pool (UCP) gate installation in Modes 1, 2, and 3, and drain-down of reactor cavity portion of the UCP in Mode 3.

The staff of the Reactor Systems Branch (SRXB) has reviewed the LAR and found that it is acceptable. The SRXB staff provides its bases for approval in the Enclosure. This effort completes the SRXB review of the LAR under TAC No. MF7476.

Docket No.: 50-440

Enclosure:
Safety Evaluation

CONTACT: Fred Forsaty, NRR/DSS
301-415-8523

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Accession No.: ML17004A295 NRR-106

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DATE	01/03/2017	1/05/2017

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 154 TO FACILITY

FIRSTENERGY NUCLEAR OPERATING COMPANY (FENOC)

PERRY NUCLEAR POWER PLANT, OPERATING LICENSE NO. NPF-58

DOCKET NO. 50-440

1.0 INTRODUCTION

By application dated March 15, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16075A411) FirstEnergy Nuclear Operating Company (FENOC) submitted an amendment application for the Perry Nuclear Power Plant (PNPP). The proposed amendment would revise Technical Specifications (TSs) of Facility Operating License No. NPF-58 for PNPP. PNPP is a General Electric (GE) Boiling-Water Reactor (BWR) 6 Mark III design (BWR designs, ML023010606).

2.0 PROPOSED CHANGE

The proposed amendment (Accession No. ML16075A411) would modify TS 3.6.2.2, "Suppression Pool Water Level," as well as TS Surveillance Requirements (SRs) 3.6.2.4.1 and 3.6.2.4.4 associated with TS 3.6.2.4, "Suppression Pool Makeup (SPMU) System" to allow installation of the reactor well to steam dryer storage pool gate in the Upper Containment Pool (UCP) in MODEs 1, 2, and 3. The proposed amendment would also create a new Special Operations TS, TS 3.10.9, "Suppression Pool Makeup - MODE 3 Upper Containment Pool Drain-Down," to allow draining of the reactor well portion of the UCP in MODE 3.

3.0 REGULATORY EVALUATION

Appendix A to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, “General Design Criteria for Nuclear Power Plants,” General Design Criterion (GDC) 4, “Environmental and Dynamic Effects Design Bases,” requires that Structures, Systems, and Components important to safety (such as the containment and the suppression pool) shall be appropriately protected against dynamic effects. Standard Review Plan Section 6.2.1.1.C specifies that this includes suppression pool dynamic effects during a Loss-Of-Coolant Accident (LOCA) or following the actuation of one or more Reactor Coolant System (RCS) Safety Relief Valves (SRVs). The licensee’s proposal affects the water level in the suppression pool and, therefore, affects the hydrodynamic loads on the containment structure, including the drywell and the suppression pool.

ENCLOSURE

GDC 16, "Containment Design," requires the containment to be a "leak tight barrier" and to assure that the containment design conditions important to safety are not exceeded for as long as postulated accident conditions require. The initial water inventory in the suppression pool and the additional water supplied by the SPMU system are important for compliance with the requirements of GDC 16.

GDC 38, "Containment Heat Removal," requires that the Containment Heat Removal System remove heat from the reactor containment following a LOCA so that the containment pressure and temperature following a LOCA will be maintained at acceptably low levels. The initial water inventory in the suppression pool and the additional water supplied by the SPMU system are important for compliance with the requirements of GDC 38.

GDC 50, "Containment Design Basis," requires that the reactor containment structure and its internal compartments accommodate, without exceeding the design leakage rate and with sufficient margin, the calculated pressure and temperature conditions resulting from any LOCA. The margin must include conservatism of the calculation model and input parameters.

4.0 SYSTEM DESCRIPTION

Description of the Upper Containment Pool and its Safety Function

PNPP is a BWR 6 with a Mark III containment (BWR designs, ML023010606). The containment building encloses the drywell. The drywell is a cylindrical, reinforced concrete structure with a removable head. The reactor cavity portion of the UCP lies above the drywell head. The drywell encloses the reactor vessel and the RCS. It is designed to withstand the pressure and temperature of the steam generated by a RCS pipe rupture, and channel the steam to the suppression pool via horizontal vents located in the drywell wall. The suppression pool contains a large volume of water which rapidly condenses steam directed to it. Initially, the air in the drywell is forced into the suppression pool by the steam discharging from the postulated break and pressurizes the containment.

The drywell provides the structural support for the UCP. The UCP provides several functions, 1) radiation shielding when the reactor is in operation, 2) storage space for the dryer, separator, and fuel assemblies during refueling, 3) an area for fuel transfer during refueling, 4) storage for control blade guides, new blades, refueling tools, and other irradiated and unirradiated components (fuel assemblies are not stored in the UCP during operation), and 5) the UCP provides water to the suppression pool following a LOCA by means of the SPMU system. The SPMU system consists of two 100 percent capacity lines. Each one directs a portion of the UCP water to the suppression pool by gravity when two normally closed valves in each line are automatically opened in response to either a low-low suppression pool water level signal or a timer set for 30 minutes after the LOCA begins.

PNPP TS 3.6.2.2 specifies the limits on the minimum and maximum water levels in the suppression pool. The minimum suppression pool water level limit ensures adequate coverage of the horizontal drywell vents, which maintains the pressure suppression function when steam is discharged from the SRV quenchers, the horizontal drywell vents, and the Reactor Core Isolation Cooling (RCIC) turbine exhaust lines. The minimum level also ensures Net Positive Suction Head (NPSH) is available for Emergency Core Cooling System (ECCS) pumps that take suction from the suppression pool. As the ECCS flow is injected into the reactor pressure vessel and containment (as spray), some of the inventory becomes entrapped in plant locations that prevent the return of the flow back to the suppression pool. The minimum level specified by

TSs ensures, during draw down by the ECCS pumps, that the top drywell vents in the suppression pool remain submerged by 2 feet to maintain the design-basis functions of the system.

The suppression pool volume plus the makeup volume from the upper pool is adequate to supply all possible post-accident entrapment volumes for suppression pool water, and keep the suppression pool at an acceptable water level. In order to ensure the proper amount of water is transferred to the suppression pool, TS SR 3.6.2.4.4 requires that the reactor well to steam dryer storage pool gate must be removed (or placed in its stored position) when in MODES 1, 2, and 3.

The water supplied by the SPMU system, together with the water inventory in the suppression pool, is sufficient for all safety-related functions of the suppression pool. These safety-related functions include: 1) providing ECCS with a source of water for injection into the vessel following a LOCA, 2) providing a heat sink for the decay and sensible heat released during reactor blowdown from the SRVs or from a LOCA, 3) providing adequate NPSH to the ECCS pumps, 4) condensing steam discharged from the RCIC system turbine, 5) providing a long-term heat sink for cooldown of the reactor, and (6) maintaining structural loads on the drywell and containment structures within acceptable limits.

The minimum suppression pool water level limit ensures adequate coverage of the horizontal vents during the initial portion of the LOCA. This ensures that steam discharged from the SRV quenchers, main vents, and the RCIC turbine exhaust lines is completely condensed. The ECCS takes suction from the suppression pool. The suppression pool water is injected into the reactor vessel and spills out of the break. This water forms a pool in the bottom of the drywell inside the weir wall. This pool is referred to as the drywell pool. The water in the drywell pool is not available to the suppression pool until the water level rises sufficiently to overflow the drywell weir wall; this overflow returns to the suppression pool. The water inside and below the top of the weir wall remains unavailable, as well as water entrapped in other volumes. This entrapped water reduces the volume of water in the suppression pool; this is referred to as suppression pool drawdown. The sizing of the UCP provides sufficient water to the suppression pool to maintain the minimum suppression pool level two feet above the top row of vents, considering the entrapped water which cannot return to the suppression pool.

The entrapped volumes considered in the current analysis are: 1) the free volume inside and below the top of the drywell weir wall, 2) the added water volume needed to fill the vessel from the level at normal power operation to a post-accident complete fill of the vessel, including the top dome, 3) the volume in the steam lines out to the first Main Steam Isolation Valve (MSIV) for three lines and out to the second MSIV in the fourth line, and the containment spray hold-up on equipment and structural surfaces.

The maximum suppression pool water level limit ensures that clearing loads from the SRV discharges and suppression pool swell loads will not be excessive. The maximum level limit also ensures that the drywell weir wall has adequate freeboard so that overflow of the drywell weir wall into the drywell during an inadvertent dump of water from the UCP is minimized.

5.0 TECHNICAL EVALUATION

5.1 Hydrodynamic Load Consideration

The proposed MODE 3 drain-down operation (TS 3.10.9) requires raising the water level in the suppression pool above the current TS HWL in MODE 3 with the reactor pressurized. This has the potential to increase the hydrodynamic loads from both LOCA and SRV actuations. The licensee performed analysis (ADAMS Accession No. ML16075A411) on the hydrodynamic loads in the containment due to a primary system pipe break. The evaluations considered the impact of an increase in suppression pool water level in excess of 5 feet 2 inches above the current TS high water level limit of 18 feet 6 inches. The staff audit (ADAMS Accession No. ML16309A081) of the licensee's analysis confirmed the hydrodynamic loads imparted with the revised water level and reactor pressure less than or equal to 235 psig will be bounded by those from a postulated Design-Basis Accident (DBA) at full power operating pressure with the suppression pool filled to the current high water level limit.

The containment loads generated during the first part of a LOCA are primarily a function of the drywell pressure rise and secondarily by a function of the suppression pool water level, temperature, and other parameters. The licensee's GOTHIC analysis, audited by the staff (ADAMS Accession No. ML16309A081) of the limiting LOCA in MODE 3 Main Steamline Break (MSLB), with the primary system at 235 psig following two hours of post- shutdown decay and with the suppression pool water level near the top of the drywell weir wall, calculated a peak drywell pressure of 13.8 psig (28.53 psia). This compares with a peak drywell pressure of 23.7 psig (38.38 psia) for a GOTHIC analysis of the design-basis MODE 1 MSLB accident with the suppression pool level at the current TS HWL limit of 18 feet 6 inches. Therefore, the containment loads at the MODE 3 drain-down conditions are bounded by the licensing design basis analysis evaluated at full power operating pressure.

Water Jet Loads

During the vent clearing transient, the weir wall, the weir side of the drywell wall and the LOCA vents will experience drag loads due to the suppression pool water being forced through the weir annulus and the LOCA vents by the rising drywell pressure. Water jets from the LOCA vents will impose impingement loading on the containment wall.

All of these loads are primarily a function of the drywell pressure. For the low pressure LOCA in MODE 3 the staff audit of related licensee's analysis (ADAMS Accession No. ML16309A081) confirmed the loads are smaller than the DBA loads due to the reduced drywell pressure and that the increased liquid level in the suppression pool have no additional impact on these loads, and therefore the calculated license water jet loads are acceptable.

5.1.2 LOCA Air Bubble Loads

As the air from the drywell is forced through the vents to the suppression pool and air rises through the pool, differential pressures are imposed on the weir wall, drywell wall, containment wall, and base mat. These pressure differentials arise from the drywell to containment pressure differential, the low pressure in the annulus due to the high velocity flow, and the local pressure variation due to the bubble formation in the suppression pool.

The peak drywell to containment pressure differential (PNPP Updated Final Safety Analysis Report (UFSAR) Chapter 15, ADAMS Accession No. ML15314A182, not publically available)

and the peak vent flow are lower for the low pressure LOCA in MODE 3 than for the DBA and the associated loads will be smaller for the low pressure events. As discussed below, pool bubble dynamics in the suppression pool are expected to be less for the lower pressure events and therefore produce lower pressure differentials.

Pool Swell Drag and Impact Loads

During a LOCA, the air in the drywell is forced into the suppression pool through the vents. The air forms a bubble in the pool, lifting the pool surface. The bubble rises through the rising pool surface, eventually breaking through and forming froth at the top of the pool. There are impact loads on equipment and structures that are initially above the pool surface and drag loads on equipment and structures in the rising pool.

The impact loads are a function of the pool surface velocity (Reference 1). The pool swell rate is a function of the air flow through the vents. The bubble grows until the pressure inside the bubble comes into equilibrium with the pool pressure. For the low pressure LOCA, the drywell pressure feeding the bubble is smaller than the DBA drywell pressure and the resultant vent flow rates are smaller. The ultimate bubble size in a low pressure LOCA will be smaller than that experienced during a DBA and the rate of bubble growth will be smaller, resulting in smaller swell velocity and lower impact and drag loads. Further, pool swell velocity is substantially reduced (Reference 1) if there is venting through only one row of vents as opposed to two rows of vents. The staff audit of the licensee's GOTHIC analysis (ADAMS Accession No. ML16309A081) at low pressure event in MODE 3, confirmed that most of the venting occurs through the top row of vents with only a brief period of flow passing through the second row of vents and none through the bottom row of vents.

Therefore, the staff concludes the pool swell and impact loads associated with a LOCA at reduced pressure during MODE 3, with an increased suppression pool water level, will be less than the full-power MODE 1 DBA analysis results.

Fallback Loads

The licensee in the LAR states that after the bubble breaks through the pool surface, water will fall back to the pool imposing impact and drag loads on equipment and structures. During the low pressure LOCA in MODE 3 the pool swell is smaller than that experienced for the DBA. The staff audit (ADAMS Accession No. ML16309A081) of the PNPP LOCA analyses results and the review of PNPP UFSAR Chapter 15 (ADAMS Accession No. ML15314A182, not publically available) confirmed the maximum velocity of the falling water impact loads, and drag loads are smaller in the low pressure events, and therefore are acceptable.

Froth Impingement and Drag Loads

The licensee in the LAR (ADAMS Accession No. ML16075A411) states that, when the bubble breaks though the pool surface, the release of air from the pool creates a froth that can impinge and drag on structures and equipment and, in particular, on the Hydraulic Control Unit floor. The staff recognizes that since the initial bubble volume, the pool swell, and the vent flow rates are all smaller in the low pressure events as compared to the DBA, therefore, there exits less froth and the maximum froth level is lower during the low pressure events. Therefore, the staff concludes the loads are all bounded by the DBA, and are acceptable.

Condensation Oscillation Loads

Once the vents have cleared and the pool swell transient has passed, there could be a period where the surface of the steam bubble that forms in the pool just beyond the top vent oscillates at low frequencies causing cyclic loading on submerged pool structures and boundaries.

The condensation Oscillation Loads (COs) can occur in the low pressure LOCA as well as the DBA. The magnitude and frequency of the CO loads are functions of the pool temperature, vent steam/air flows, and air mass fraction flowing through the vent. GE developed load and frequency functions (PNPP UFSAR Appendix 3B, “Containment Loads”) that consider these effects and are bounding for all break events. In addition the strength of the pressure pulses at the upper vent is independent of the vent submergence and vent submergence is not a parameter in the GE methodology accepted by the U.S. Nuclear Regulatory Commission (NRC) for calculating CO loads on equipment (PNPP UFSAR Appendix 3B, “Containment Loads”, not publically available). Therefore, the staff agrees with the licensee analysis and concludes that the CO load function is bounding for the low pressure LOCA.

Chugging Loads

The licensee in the LAR (ADAMS Accession No. ML16075A411) states that, when the steam flow through the top vents falls below 10 lbm/ft^2-s, the oscillatory condensation turns to an erratic chugging mode with a pressure pulse generated. The Nuclear Regulatory Commission (NRC) has previously determined that loads analysis for chugging for the DBA cover all break sizes (Reference 1) and that chugging in the low pressure LOCA is not expected to be significantly different from other cases previously considered. In addition the vent submergence was not identified as a significant parameter affecting chugging loads and is not used in the method recommended by GE for calculating chugging loads ((PNPP UFSAR Appendix 3B, “Containment Loads”, not publically available.)

Humphrey Concern 19.1 (Reference 2) identified that increased vent submergence could cause an increase in chugging loads. A technical evaluation was performed (Reference 3). Considering a vent submergence up to 12 feet and determined that, in general, the GE load definition enveloped the increased chugging loads. Localized loads in the frequency range between 15 and 32 Hz may exceed the load definition. The exceedances were deemed acceptable since they represented either a small percentage overload or were applied to the basemat. The exceedance on the basemat is not of any consequence since the hydrostatic head ensures that a negative pressure will not be imposed on the liner and there are no natural modes of vibration that are excitable. The NRC staff accepted this response as documented in the Perry Safety Evaluation Report (SER), Reference 3. The NRC SER disposition documents Humphrey Concern 19.1 envelopes the chugging loads for the proposed increase in the suppression pool level for MODE 3 drain-down.

Drywell Depressurization Loads

When ECCS water is eventually injected into the vessel, it may spill into the drywell and condense the steam, depressurizing the drywell. This results in inward loads on the drywell wall. The low pressure in the drywell can cause the flow through the vents to the suppression pool to come back into the weir annulus and up through the annulus into the drywell introducing potential jet impingement, impact, and drag loads.

All of these loads are primarily a function of the containment pressure at the time of depressurization. The design basis for these loads assumes (PNPP UFSAR Appendix 3B, “Containment Loads”, not publically available) that drywell vacuum breakers are non-functional and that the containment temperature is at the suppression pool temperature to maximize the containment pressure. The staff audit (ADAMS Accession No. ML16309A081) of the PNPP GOTHIC analyses results confirmed that during the drain down in Mode 3, the energy deposited to the suppression pool is less than in the DBA and the suppression pool temperature is lower. Therefore, the staff concludes that that during the drain down in Mode 3 the containment pressure will be lower than the DBA analyzed pressure.

Safety Relief Valve Actuation Loads

Hydrodynamic loads from the SRV actuation are partially dependent on discharge leg submergence. The loads, however, are far more dependent on reactor vessel pressure. The impact of increased suppression pool levels, up to five feet over normal suppression pool high water level, on SRV loads was previously addressed with the resolution of Brookhaven National Laboratory concerns BNL-2 and BNL-3 as documented in the Perry SER, Reference 3. The staff review of the SER indicates that the SRV discharge line thrust loads are within the capability of the existing SRV discharge line configurations. Therefore the staff agrees with the licensee (ADAMS Accession No. ML16075A411) and concludes that during MODE 3 drain down conditions, the loads from an SRV lift will be less than the design values (Staff Audit of the licensee’s supporting analyses, ADAMS Accession No. ML16309A081.)

Based on the above evaluations in Sections 5.1.1 through 5.1.9, the staff concludes the containment loads at the MODE 3 drain-down conditions are bounded by the design basis analyses evaluated at full power operating pressure, in compliance with GDC 50.

5.2 Net Positive Suction Head of the Emergency Core Cooling System Pumps

The ECCS pumps, including the Low Pressure Coolant Injection, High Pressure Core Spray, and Low Pressure Core Spray system pumps, have been analyzed for NPSH requirements in the Perry UFSAR [Chapter 5 (ML15314A171), and Chapter 6 (ML15314A172), not publically available]. The analyses are performed assuming 212 °F suppression pool temperature (clean strainer) and 185 °F (full loaded strainer), design pump runout flows, and atmospheric conditions. The UFSAR analyses show that adequate NPSH is available with the suppression pool level at the minimum drawdown elevation of 14 feet 2 inches above of the bottom of the suppression pool. This pool level is also sufficient to eliminate concerns such as vortexing, flashing, and cavitation during a LOCA. The proposed changes to the suppression pool and UCP levels ensure that the minimum suppression pool drawdown level of 14 feet 2 inches is protected. Further, the long-term GOTHIC simulations audited by the staff (ADAMS Accession No. ML16309A081) confirms that suppression pool temperatures under MODE 3 post-accident conditions remain below the design basis limits. Therefore, the staff concludes there are no concerns regarding ECCS pump NPSH requirements as a result of these changes.

5.3 Long Term Heat Sink

The suppression pool volume provides a long-term heat sink for the decay and sensible heat released during a LOCA. The licensee in the LAR states (ADAMS Accession No. ML16075A411) that the suppression pool volume required for MODE 3 drain-down conditions will be increased to offset the reduction in SPMU system dump volume when the reactor well is drained. The combined water inventory between the UCP and the suppression pool will

therefore be maintained during the drain-down of the reactor well in MODE 3 to ensure that a minimum heat sink inventory in the suppression pool during a design-basis event is sufficient to provide the necessary long-term heat removal. Thus, the heat sink volume available under the proposed MODE 3 drain-down conditions provides the necessary post-accident heat sink to ensure the long-term suppression pool temperatures remain within limits (that is, 185 °F), and consequentially, the containment air pressure and temperature remain within limits.

The staff audit of the licensee GOTHIC simulations (ADAMS Accession No. ML16309A081) for PNPP MSLB DBA with the reactor well drained, confirmed a peak long-term suppression pool temperature maintains an approximate 12 °F margin between the calculated pool temperature and the design temperature limit of 185 °F for the suppression pool. In addition, the staff questioned the conservatisms used by the licensee in the GOTHIC analysis performed in support of the LAR, related to SLB (ML16312A359). In response (ML16312A359), the licensee indicated the GOTHIC model incorporated input assumptions similar to the PNPP's licensing-basis methodology, which complies with the GDC 50 requirements, and has been previously approved by the NRC staff. Therefore, the staff concludes that the licensee GOTHIC analysis considering the PNPP MSLB DBA with the reactor well drained is acceptable, and that the long-term suppression pool temperatures remain within limits.

5.4 Drywell Bypass Small Break LOCA with Steam Bypass of Suppression Pool

The design of the pressure suppression reactor containment is such that any steam released from the primary system is condensed by the suppression pool and does not have an opportunity to produce a significant pressurization effect on the containment. This is accomplished by channeling the steam into the suppression pool through a vent system. This arrangement forces steam released from the primary system to be condensed in the suppression pool. Should a leakage path exist between the drywell and containment, the leaking steam would result in pressurization of the containment. To mitigate the consequences of any steam bypassing the suppression pool, a high containment pressure signal automatically initiates the containment spray system any time after LOCA plus ten minutes (PNPP UFSAR Chapter 15, ADAMS Accession No. ML15314A182, not publically available). The original design basis assumptions for the allowable bypass calculations are that containment spray is activated 180 seconds after containment pressure reaches 9 psig or at LOCA plus 13 minutes, whichever occurs later (PNPP UFSAR Chapter 15, ADAMS Accession No. ML15314A182, not publically available.)

The staff audit of GOTHIC analyses (ADAMS Accession No. ML16309A081) confirmed a peak containment pressure of about 29.00 psia (about 14.90 psig) for the most limiting break size (0.5 ft^2), which is just below the containment design limit of 29.70 psia (15 psig). This information is also illustrated in Figure 13 of Attachment 4 of the LAR (ADAMS Accession No. ML16075A411) that shows the peak pressure complies with the containment pressure design limit, and is acceptable.

5.5 Dump Time

During the time when the ECCS pumps are pumping water out of the suppression pool, water level will decrease until it reaches the Low-Low Water Level (LLWL). At that level, the dump valves in the SPMU system will open and the water inventory available in the UCP will dump to the suppression pool. Water will flow into the suppression pool from the UCP at the same time water continues to flow out of the suppression pool via the ECCS pumps. This condition is

evaluated to verify that the flow of water into the suppression pool from the SPMU system is sufficient to ensure that the water coverage above the horizontal vents is not compromised.

To ensure drywell vent coverage of 2 feet is maintained during an upper pool dump, the SPMU system design requires that the makeup water addition from the UCP be within an allowable "dump time," defined to be less than or equal to the minimum "pump time." The pump time is determined by dividing the pumping volume (upper pool makeup volume plus the volume in the suppression pool stored between the LLWL and the minimum top vent coverage) by the total maximum runout flow rate from all five ECCS pumps.

The pumping volume considers the suppression pool makeup volume, which is reduced following reactor well gate installation and reactor well drain. The staff audited (ADAMS Accession No. ML16309A081) the licensee's analysis of the SPMU dump time for operations with the gate installed and with the reactor well pool drained. With gates installed (MODES 1, 2, and 3) and the UCP level at 23 feet 0 inches above RPV flange, the allowable dump time is less than the pump time. The staff reviewed the analysis results, and confirmed for the reactor well pool drained in MODE 3, the allowable dump time is less than the pump time. Therefore, the staff concludes the SPMU "dump time" meets GDCs 16 and 50, and therefore, is acceptable.

6.0 CONCLUSION

The NRC staff has reviewed the licensee's regulatory and technical analyses, in support of its proposed license amendment (ADAMS Accession No. ML16075A411). The staff finds that the licensee used NRC methods to demonstrate compliance with regulatory requirements identified in Section 3 of this SER. Therefore, the proposed changes in the LAR to modify TS 3.6.2.2, "Suppression Pool Water Level," as well as TS SRs 3.6.2.4.1 and 3.6.2.4.4 associated with TS 3.6.2.4, "Suppression Pool Makeup (SPMU) System" to allow installation of the reactor well to steam dryer storage pool gate in the UCP in MODEs 1, 2, and 3, and the new TS to allow draining of the reactor well portion of the UCP in MODE 3 comply with GDC 16, GDC 38, GDC 50, and Appendix A to 10 CFR Part 50, and are acceptable.

7.0 REFERENCES

NRC Letter, "Amendment No. 100 to Facility Operating License No. NPF-58- Perry Nuclear Power Plant, Unit 1 (TAC No. MA3486)," February 24, 1999 (ML021840212).

Letter from L. L. Kintner (NRC) to O. D. Kingsley (SERI), "SER Relating to Concern", dated March 23, 1987.

PNPP Letter PY-CEI/NRR-2614L, "License Amendment Request Pursuant to 10CFR50.90: Inclined Fuel Transfer System (IFTS)," March 14, 2002 (ML020870456).