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FPL Energy
Point Beach Nuclear Plant

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Point Beach Nuclear Plant, Units 1 and 2
Dockets 50-266 and 50-301
Renewed License Nos. DPR-24 and DPR-27

License Amendment Request 260
One-Time Extension of Completion Time for
Technical Specification 3.7.5, Auxiliary Feedwater System

Pursuant to 10 CFR 50.90, FPL Energy Point Beach, LLC (FPLE-PB) hereby requests to amend Facility Operating Licenses DPR-24 and DPR-27 for Point Beach Nuclear Plant (PBNP), Units 1 and 2, respectively. FPLE-PB proposes to revise Technical Specification (TS) 3.7.5 "Auxiliary Feedwater," for Units 1 and 2. The proposed change would allow two separate one-time extensions of the completion time (CT) of LCO 3.7.5.C from seven days to 16 days. FPLE-PB has evaluated the proposed change in accordance with 10 CFR 50.92 and concluded that the change involves no significant hazards consideration.

The proposed amendment follows the guidance in Regulatory Guide (RG) 1.177, "An Approach for Plant-Specific, Risk Informed Decision Making: Technical Specifications," August 1998. FPLE-PB has performed an analysis showing that the increase in risk resulting from the proposed amendment is small and within established guidance. FPLE-PB has also determined that defense-in-depth principles will be maintained based on both risk and other considerations.

The purpose for the requested CT extension is to replace both motor-driven auxiliary feedwater (MDAFW) pumps. These modifications will address narrowing design margins resulting from increased rigor in analyses and from anticipated plant changes. There are four operable but nonconforming or degraded conditions associated with the auxiliary feedwater system (AFW) that will be partially or fully resolved by the modifications.

Enclosure 1 contains the List of Regulatory Commitments associated with this application. The summary of Regulatory Commitments lists actions that will be taken to provide additional assurance that the changes and risk are well managed and conservative. Enclosure 2 contains a description and analysis of this request. Enclosure 3 contains a markup of the affected TS pages. Enclosure 4 contains a simplified drawing of the auxiliary feedwater system.

FPLE-PB requests approval of the proposed license amendment by August 1, 2008, with the amendment being implemented within 30 days of NRC approval and accompanying safety evaluation. Obtaining approval by August 1, 2008, will allow PBNP adequate time to implement the coordination of scheduled plant activities associated with the committed surveillances prior to entering the extended Technical Specification Action Condition (TSAC) for the MDAFW pump replacement. Delivery of the new MDAFW pumps is currently expected to occur in late August of 2008. Replacement of the existing MDAFW pumps with the higher capacity pumps will resolve design basis non-conformances. The MDAFW pump replacements shall occur prior to August 1, 2009.

The modification activity is planned to be performed with both PBNP reactors on line and at power. The reason for performing this activity on line is to enable overall site focus upon this single activity, as described in Enclosure 2. A deterministic and probabilistic evaluation of the impact of removing a single MDAFW pump from service for 16 days was performed. This evaluation concluded that, provided no other single failure of a redundant AFW system component occurs, the license basis accident mitigation capability would be maintained. It also concluded that from a probabilistic perspective, the delta CDF, LERF, ICCDP and ICLERP support the requested extension of TSAC 3.7.5.

<u>Summary of Regulatory Commitments</u>

The list of Regulatory Commitments supporting this application is provided in Enclosure 1.

This submittal has been reviewed by the Plant Operations Review Committee.

In accordance with 10 CFR 50.91, a copy of this application, with enclosures, is being provided to the designated Wisconsin Official.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on December 29, 2007.

Very truly yours,

FPL Energy Point Beach, LLC

James H. McCarthy
Site Vice President

Enclosures (1) List of Regulatory Commitments
(2) Description of Proposed Change
(3) Marked Up Technical Specification Changes
(4) Simplified Diagram of Auxiliary Feedwater System

cc: Regional Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC
PSCW

ENCLOSURE 1

FPL ENERGY POINT BEACH, LLC
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

LICENSE AMENDMENT REQUEST 260
ONE-TIME EXTENSION OF COMPLETION TIME FOR TECHNICAL SPECIFICATION 3.7.5 AUXILIARY FEEDWATER SYSTEM

LIST OF REGULATORY COMMITMENTS

The following list identifies the Regulatory Commitments contained in this document. Other statements in this submittal represent intended or planned actions. They are provided for information purposes and are not considered to be Regulatory Commitments.

The Regulatory Commitments listed below will remain in effect for the duration of the proposed duration of the one-time TSAC 3.7.5 extension, as appropriate.

- During the motor-drive auxiliary feedwater (MDAFW) pump upgrade replacements, no other work that impacts risk will be planned to take place concurrent with this work. Emergent work to assure continued reliability of redundant auxiliary feedwater (AFW) trains will be coordinated and managed using the on-line risk management process.
- Redundant operable AFW trains and supporting systems will be protected from inadvertent challenges in accordance with PBNP procedure NP 2.1.8, “Protected Equipment.”
- Periodic tours of the protected area(s) will be performed and logged by cognizant Operations watch standers to verify the continuing OPERABILITY of the protected equipment.
- Pre-job and pre-shift briefings of implementing work group personnel emphasizing the risk aspects of the planned evolution.
- Pre-shift awareness briefings of the replacement activities with the on-coming operating shift emphasizing current status of the work in progress.
- A challenge board comprised of FPL personnel experienced in work planning, scheduling, and execution will review and critique the planned work for each MDAFW pump replacement.
- There will be twenty-four hour (24-hour) staffing of the Outage Control Center (OCC) until the MDAFW pump being replaced has been successfully tested and accepted by Operations. As a minimum, the OCC staff will consist of an Outage Shift Manager, Outage Maintenance Manager, Outage Operations Manager, and an Outage Engineering Manager. These personnel shall have the authority to direct station resources as needed to expedite completion of the work and resolve related emergent issues.
- The work will be scheduled and staffed to proceed around the clock without interruption until the affected MDAFW pump being replaced has been successfully tested and accepted by Operations.
- Parts and materials in support of the replacement will be verified to be correct and will be verified to be on-hand prior to removing a MDAFW pump from service.
- Parts and materials will be staged before needed by the work in progress.

- Parts will be pre-fabricated to the maximum extent practical.
- Parts and equipment will be retained and prepared for reinstallation to the extent practical as a recovery contingency.
- Implementing work group personnel will conduct turnover on-station to minimize down-time between shifts.
- Tagout activities will be pre-planned and the tagout series will be prepared in advance of removing the MDAFW pump from service.
- The lessons learned from replacement of the first MDAFW pump will be reviewed and incorporated, as applicable, into the work planning for replacement of the second MDAFW before the work is started.
- OPERABILITY of both unit-specific TDAFW pump systems and the other MDAFW pump system shall be verified within 24 hours prior to making one MDAFW pump INOPERABLE for pump and motor replacement by satisfying TS SR 3.7.5.1. After the initial SR is met, TS SR 3.7.5.1 frequency shall be increased to daily until the newly replaced MDAFW pump is declared OPERABLE:
  - TS SR 3.7.5.1 Verify each AFW manual, power operated, and automatic valve in each water flow path, and in both steam supply flow paths to the steam turbine driven pump, that is not locked, sealed or otherwise secured in position, is in the correct position.
- OPERABILITY of both unit specific TDAFW pump systems and the other MDAFW pump system shall be demonstrated within 72 hours prior to making one MDAFW pump INOPERABLE for pump and motor replacement by satisfying TS SR 3.7.5.2:
  - TS SR 3.7.5.2 Verify the developed head of each required AFW pump at the flow test point is greater than or equal to the required developed head.
- OPERABILITY of the applicable train specific emergency diesel generators (associated with the OPERABLE MDAFW pump) shall be demonstrated within seven days prior to making one MDAFW pump INOPERABLE for pump and motor replacement by satisfying TS SR 3.8.1.1, 3.8.1.2 and 3.8.1.3:
  - TS SR 3.8.1.1 Verify correct breaker alignment and indicated power availability for each required offsite circuit.
  - TS SR 3.8.1.2 Verify each standby emergency power source starts from standby conditions and achieves rated voltage and frequency
  - TS SR 3.8.1.3 Verify each standby emergency power source is synchronized and loaded and operates for ≥60 minutes at a load ≥2500 kW and ≤2850 kW.
- A roving fire watch will be conducted to tour the seven potential fire areas of concern to monitor and ensure that combustible loading, work activities and other activities that could increase the likelihood of a fire are minimized.
- Initial baseline thermography of potential fire initiators in the seven fire areas of concern will be performed within seven (7) days prior to starting the modification. The thermography will be repeated weekly thereafter until restoration of the MDAFW pump to service to detect degrading operating equipment.

- Upcoming preventive maintenance activities will be reviewed for the redundant AFW trains and supporting equipment. These preventive maintenance activities will be completed in advance of the planned work to the extent practical.
- Outstanding corrective work orders on AFW and supporting systems will be reviewed and those that may challenge the reliability and capability of the redundant pumps to complete their design functions will be completed prior to removing a MDAFW pump from service for upgrade replacement (the corrective work orders to upgrade the pumps by replacing them are not subject to this review as it would create an impasse).
- Open corrective action program (CAP) items for the AFW and supporting systems will be reviewed to determine which (if any) could challenge the reliability of the redundant AFW pumps during the extended TSAC period. These will be addressed and corrected commensurate with their safety significance prior to removing an MDAFW pump from service for replacement (the CAP items to replace the MDAFW pumps are not subject to this review as it would create an impasse).
- Planned work in the switchyard and on the internal AC distribution system (including protective relaying) that could cause a loss of off site power to the main feed pumps will not be scheduled for performance during the TSACs. Emergent work to assure continued reliability of offsite power will be coordinated and managed using the on-line risk management process.

ENCLOSURE 2

FPL ENERGY POINT BEACH, LLC
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

LICENSE AMENDMENT REQUEST 260
ONE-TIME EXTENSION OF COMPLETION TIME FOR
TECHNICAL SPECIFICATION 3.7.5
AUXILIARY FEEDWATER SYSTEM

EVALUATION OF PROPOSED CHANGE

1.0 SUMMARY DESCRIPTION

This License Amendment Request is submitted to revise the Point Beach Nuclear Plant (PBNP) Units 1 and 2 Technical Specifications (TS) requirement for the completion time (CT) of TS 3.7.5.C. This revision would allow two separate one-time extensions of the CT for TS 3.7.5.C from seven days to 16 days; one extension for each of the train-specific motor-driven auxiliary feedwater (MDAFW) pumps.

The proposed amendment follows the guidance in Regulatory Guide (RG) 1.177, "An Approach for Plant–Specific, Risk Informed Decision Making: Technical Specifications," August 1998. In accordance with RG 1.177, FPL Energy Point Beach, LLC (FPLE-PB) has performed an analysis showing that the increase in risk resulting from the proposed amendment is small and within established guidance.

2.0 DETAILED DESCRIPTION

The proposed license amendments would revise TS 3.7.5.C to allow two separate one-time extensions of the CT from seven days to 16 days for both PBNP Units 1 and 2 to accommodate pump and motor replacement of each MDAFW pump.

These modifications will resolve portions of the following four Operable but nonconforming or degraded conditions.

- OPR 44 - The main steam safety valve (MSSV) setpoint tolerance was not accounted for in the historic analysis of auxiliary feedwater (AFW) pump capability (Calculation N-94-158, "Verification of Required AFW Pump Differential Head for Accidental Flow Rate").
- OPR 109 - The MDAFW pump discharge pressure control valves (AF-4012 and AF-4019) are set up to maintain a constant pressure of 1200 psi. When instrument uncertainty is considered, the MDAFW pumps could no longer be assured of providing the flow rate credited in the licensing basis analyses.
- OPR 154 - A calculation (2004-0002) showed that during a degraded voltage condition, breakers on some 480 V AC buses could trip on overcurrent. Loading restrictions were implemented on the affected buses. Powering the MDAFW pumps from 4160 V buses will remove loading restrictions associated with the MDAFW pumps.
- OPR 155 - A calculation (2004-0002) showed that transformers 1X-13 and 2X-14 are potentially overloaded during a loss of coolant accident (LOCA). Powering the MDAFW pumps from 4160 V buses will remove load from these transformers and resolve the potential overload condition.

The existing MDAFW pumps are Byron Jackson model DVMX 3x4x9B (9 stage) pumps, and have a design capacity of 200 gpm at approximately 2760 feet of total dynamic head. The replacement MDAFW pumps are Flowserve model DVMX 3x4x9 (9 stage) pumps with a specified design flow rate of 240 gpm at approximately 3100 feet of total dynamic head. The replacement pumps are designed to fit within the same dimensional foot print of the existing installation. The installation of the new pumps will significantly improve the head margin of the pumps.

The existing MDAFW pump motors will be replaced with higher capacity pumps and motors. The existing motors are 460 V AC, 3-phase, rated at 250 HP. The existing motors operate at a brake horsepower of approximately the motor rating. These motors are supplied from the 480 V AC switchgear. The proposed replacement motors are 4 KV AC, 3-phase, rated at

350 HP. These motors will operate at a brake horsepower of approximately 300 HP. The increase in emergency diesel generator loading has been factored into the station electrical analysis, and determined to be acceptable.

The proposed CT increase for TS 3.7.5.C from seven days to 16 days for both Units 1 and 2 is acceptable because with one MDAFW pump inoperable for replacement, the PBNP design for AFW remains capable of providing adequate AFW to meet the flow requirements of the design basis accident analysis for AFW. This may be accomplished with the redundant MDAFW pump providing 200 gpm to one unit-specific steam generator, or with the unit-specific turbine-driven AFW (TDAFW) pump providing 200 gpm to one or both unit-specific steam generators.

With one MDAFW pump out of service for pump and motor replacement, the radiological analyses input assumptions regarding AFW availability and isolation remain valid and the radiological analysis conclusions remain bounding.

2.1 <u>Background</u>

A simplified diagram of the AFW system is provided in Enclosure 4 of this application. Per the PBNP Final Safety Analysis Report (FSAR), the AFW system is designed to supply high-pressure feedwater to the steam generators to maintain a water inventory for removal of heat energy from the reactor coolant system by secondary side steam release in the event of inoperability or unavailability of the main feedwater system. Redundant supplies are provided by two pumping systems using different sources of power for the pumps. The design capacity of each system is set so that the steam generators will not boil dry nor will the primary side relieve fluid through the pressurizer relief valves, following a loss of main feedwater flow with a reactor trip.

The PBNP AFW system consists of two electric motor-driven pumps, two steam turbine-driven pumps, pump suction and discharge piping and the controls and instrumentation necessary for operation of the system. Redundancy is provided by utilizing two pumping systems, two different sources of power for the pumps and two sources of water supply to the pumps. The system is categorized as Seismic Class I and is designed to ensure that a single active failure will not obstruct the system function.

One system is common to both units and utilizes two similar motor-driven pumps (P-38A and P-38B), each capable of obtaining its electrical power from the plant emergency diesel generators. Each pump has a capacity of 200 gpm with pump P-38A capable of supplying the A steam generator in either or both units, and with pump P-38B capable of supplying the B steam generator in either or both units. In addition, the discharge of the motor-driven AFW pumps can be cross connected via manually operated valves. During this modification, the cross connection capability will not be available because the valves will be part of the out of service isolation boundary.

The other system utilizes a steam turbine-driven pump for each unit (1/2P-29) with the steam capable of being supplied from either or both steam generators. This system is capable of supplying 400 gpm of feedwater to a unit, or 200 gpm to each steam generator. The pump drive is a single-stage turbine, capable of quick starts from cold standby and is directly connected to the pump. The turbine is started by opening either one or both of the isolation valves between the turbine supply steam header and the main steam lines upstream of the main steam isolation valves.

- The water supply source for the AFW system is redundant. The normal source is by gravity feed from two nominal capacity 45,000 gallon condensate storage tanks (CSTs) while the safety-related Seismic Class I supply is taken from the plant service water system whose pumps are powered from the emergency diesel generators if station power is lost.
- Since the steam generators at PBNP are of the recirculating type, substantial time is available before AFW is required because of the large water inventory in the steam generators. This time has been estimated to be at least 30 minutes.

During normal plant operations, the auxiliary feedwater system is maintained in a standby condition ready to be placed in operation automatically when conditions require. The auxiliary feedwater pumps are automatically started on receipt of any of the following signals:

<u>Turbine-Driven Feedwater Pumps</u>

- Low-low water level in both steam generators in one unit starts the corresponding pump.
- Loss of both 4160 V buses supplying the main feedwater pump motors in one unit starts the corresponding auxiliary feedwater pump.
- Trip or shutdown of both main feedwater pumps or closure of both feedwater regulating valves in one unit starts the corresponding pump. These signals are processed through ATWS Mitigating System Actuating Circuitry (AMSAC) at power levels above 40%.

<u>Motor-Driven Feedwater Pumps</u>

- Low-low water level in either associated steam generator.
- Trip or shutdown of both main feedwater pumps or closure of both feedwater regulating valves in one unit. These signals are processed through AMSAC at power levels above 40%.
- Safeguards sequence signal.

The motor-driven AFW pump discharge motor operated valves (MOVs) are configured to open automatically, and the steam generator blowdown isolation valves are configured to close automatically, based upon the same signals that start the motor-driven pumps. This ensures automatic delivery of design basis auxiliary feedwater flow to an affected unit's steam generators without operator action. Operator action is required to maintain proper steam generator levels and control auxiliary feedwater flow. Auxiliary feedwater pump flow and direct flow indication for each steam generator is provided in the control room. Flow indication is also available locally at the discharge of each pump.

The AFW system components are tested and inspected in accordance with TS surveillance criteria and frequencies. Testing verifies motor-driven pump operability, turbine-driven pump operability including a cold start, and operability of required MOVs. Control circuits, starting logic, and indicators are verified operable by their respective functional test.

The auxiliary feedwater system has no functional requirements during normal, at power, plant operation. It is used during plant startup and shutdown and during hot shutdown or hot standby conditions when chemical additions or small feedwater flow requirements do not warrant the operation of the main feedwater and condensate systems.

2.2 Current Requirements

TS 3.7.5 requires the AFW System to be OPERABLE when either unit is in MODES 1, 2, 3, and MODE 4 when steam generator is relied upon for heat removal. The AFW System is comprised of three AFW pump systems, consisting of two shared MDAFW pumps and one dedicated TDAFW pump system, including components and flowpaths for the three systems.

Per TS 3.7.5 Action Condition C.1, with one MDAFW pump system inoperable in MODES 1, 2, or 3, action must be taken to restore the MDAFW pump system to OPERABLE status within 7 days AND 10 days from discovery of failure to meet the LCO. The AND connector between the 7 day and 10 day Completion Times dictates that both CTs apply simultaneously, and the more restrictive must be met. Because the MDAFW pump systems are common to both units, per TS 3.7.5 Action Condition D.1 and D.2, if one MDAFW pump system can not be returned to OPERABLE status within the CT, each unit will be in MODE 3 within 6 hours (each unit may be sequentially placed in MODE 3 within 12 hours when both are in Condition D concurrently) AND placed in MODE 4 within 18 hours, provided the redundant MDAFW pump system is OPERABLE.

In MODE 4, only the MDAFW pump systems associated with steam generators relied upon for heat removal are required to be OPERABLE. Per TS 3.7.5 Action Condition F.1, with one or more required AFW pump systems inoperable in MODE 4, action to restore the required AFW pump system(s) to OPERABLE status shall be initiated immediately.

A Note in TS 3.7.5 prohibits the application of Limiting Condition for Operation (LCO) 3.0.4.b to an inoperable AFW pump system. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an AFW pump system inoperable and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

2.3 Basis for Current Requirements

The PBNP TS 3.7.5 CT of 7 days to restore one inoperable MDAFW system is based on the PBNP commitment and associated NRC Safety Evaluation (SE) dated April 21, 1981, regarding NUREG 0737, Item II.E.1.1, Short Term Recommendation GS-1. The NRC approval of the 7-day completion time for one MDAFW pump system inoperability was based on independent evaluations on the subject of AFW pump inoperability because of maintenance outages and its effect on system unavailability with respect to the risk of core melt. The NRC SE concluded that there was no significant effect on core melt risk between the standard 72-hour and 7-day limiting condition for operation for assumed infrequent outages when applied to the MDAFW pumps.

The PBNP Custom Technical Specification (CTS) 15.3.4.C.1 and 2 incorporated the 7-day restoration time for one inoperable MDAFW pump. The CTS Basis 15.3.4 stated that in the unlikely event of a complete loss of electrical power to the station, decay heat removal would continue to be assured for each unit by the availability of either the TDAFW pump or one of the two MDAFW pumps. It further stated that one MDAFW pump can supply sufficient feedwater for removal of decay heat from a unit.

During the conversion of CTS to the Improved Technical Specifications (ITS) based on Westinghouse Plants (NUREG 1431), this completion time was retained. The ITS Basis for TS 3.7.5 Action Condition C.1 states the 7-day CT is reasonable, based on redundant capabilities afforded by the remaining OPERABLE motor-driven and TDAFW pump systems, time needed for modifications, and the low probability of a DBA occurring during this time period.

2.4 Reason for Requesting Amendment

Extension of the CT from 7 to 16 days would allow on-line replacement of each MDAFW pump and motor combination. Replacement of these two pumps is necessary to improve overall pump performance, to partially or fully resolve the four operable but degraded or nonconforming conditions previously discussed, and to increase auxiliary feedwater system design margin.

FPLE-PB has reviewed the modification scope and completed walkdowns of the MDAFW pump replacements. The planned work has been structured to minimize out of service time. A project schedule has been developed, refined and the sequencing of work has been validated. Excluding contingencies for fit-up difficulties and discovery of emergent problems, the best estimate for completion of the critical path for restoration to service is between 6 and 7 days. FPLE-PB is requesting a one time extension of the TS Completion Time for installation of each of the two MDAFW pumps to 16 days to accommodate contingencies for unexpected as-found conditions, fit-up difficulties, or other problems that may reasonably arise during the replacement work. Removal of the existing pump and motor and associated piping and electrical components will be performed in a manner which allows for the restoration of the system to the original configuration. The restoration to the original configuration is estimated at between 8 and 9 days. This would be required should the new installation fail post-modification testing at the end of the projected best-estimate schedule. The additional time required to restore the system to the original configuration is primarily the result of the requirement to match machine the original pump and motor mountings to the machined base prepared for the replacement pump and motor. These considerations are the basis for requesting a non-standard completion time interval of 16 days rather than the standard 14 days.

Performing the MDAFW pump replacement activities with both units at power ensures stable plant conditions with the largest contingent of plant personnel, material, and management oversight resources available to focus on the modifications without the demands of a concurrent unit outage. These intangible effects have not been included in the calculation of ΔCDF, but are considered by FPLE-PB to be significant. The requested extension of the TS Completion Time could prevent a dual unit shutdown transition, with its accompanying increase in risk, when restoration to full capability can completed within a reasonable amount of time.

3.0 TECHNICAL EVALUTION

This proposed amendment request would authorize two separate one-time extensions of the CT for TS 3.7.5.C from 7 to 16 days. The proposed amendment is supported by both risk and non-risk considerations.

3.1 Risk Assessment

Risk-informed support for the proposed MDAFW pump CT extension is based on:

- A risk assessment performed to quantify the change in core damage frequency (CDF), the change in large early release frequency (LERF), the incremental conditional core damage probability (ICCDP), and the incremental conditional large early release probability (ICLERP) associated with an increase in CT for the MDAFW pumps;
- PBNP procedure NP 10.3.7, "On-Line Safety Assessment," direction for managing the risk associated with other scheduled tasks during AFW pump outages;
- Consideration of specific compensatory measures to reduce risk.

The risk impact of the proposed changes has been evaluated and found to be acceptable. The effect on risk of the proposed increase in the CT for restoration of an inoperable MDAFW pump has been evaluated using the three-tier approach provided in RG 1.177:

Tier 1 – PRA Capability and Insights;

Tier 2 - Avoidance of Risk-Significant Plant Configurations; and

Tier 3 - Risk-Informed Configuration Risk Management.

3.1.1 Method of Analysis and Results – Tier 1: PRA Capability and Insights

Administrative controls include written procedures and technical review of model changes, data updates, and risk assessments performed using PRA methods and models.

Since the Individual Plant Examination (IPE), PBNP PRA engineers have maintained the PRA models consistent with the current plant configuration such that they are considered living models. The PRA models are updated for different reasons, including plant changes and modifications, procedure changes, accrual of new plant data, discovery of modeling errors, advances in PRA technology, and issuance of new industry PRA standards. The update process ensures that the applicable changes are implemented and documented in a timely manner so that risk analyses performed in support of plant operations reflect the current plant configuration, operating philosophy, and transient and component failure history. The PRA maintenance and update process is described in a station guideline based upon best industry guidance and practices.

3.1.1.1 PRA Software

The results for this risk assessment were quantified using the WinNUPRA suite of PRA software. This software has been reviewed and accepted for use in accordance with the PBNP Software QA program and procedures.

3.1.1.2 PRA Reviews

There have been numerous reviews of the PBNP PRA, dating back to the original IPE, which had multiple levels of review. The first consisted of normal engineering practices carried out by the organization performing the analysis. A qualified individual with knowledge of PRA methods and plant systems performed a technical review of the results for each task. This represented a detailed check of the input to the PRA model and provided a high degree of accuracy.

The second level of review was performed by plant personnel not directly involved with the development of the PRA model. This review was performed by individuals from Operations, Engineering, Training, Nuclear Safety Analysis and other cognizant personnel who reviewed the system description notebooks and accident sequence description. This provided diverse expertise with plant design and operations knowledge to review the system descriptions for accuracy.

Following the PBNP IPE submittal to the NRC on June 30, 1993, it was reviewed and approved by a NRC Safety Evaluation dated January 26, 1995. The staff concluded that the PBNP IPE had met the intent of GL 88-20.

In June 2001, the PBNP PRA model underwent a peer review conducted by Westinghouse using PRA contractors and utility PRA analysts. This review produced three "A" Facts and Observations (F&Os) and 30 "B" F&Os. The "A" findings have been resolved and 20 of the "B" level findings have been fully resolved. The ten level "B" findings that remain open have had sufficient work performed toward completion such that they have dispositioned as now being of lower significance. The general categories of these open F&Os are: 1) room cooling requirements; 2) documentation of common cause methodology; 3) documentation of pre-initiator HEPs; and 4) qualification of equipment in containment for post-core damage operation. These F&Os have been reviewed and it has been determined that they will not affect the ΔCDF and ΔLERF calculations for this risk study.

In December 2006 and May 2007 gap assessments of the PRA model were performed by a team of two contractors and two offsite PRA engineers against the requirements of RG 1.200 "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities", January 2007 and ASME RA-Sb-2005 Capability Category II. Observations from this gap assessment are being addressed during the on-going RG 1.200 upgrade project.

3.1.1.3 ΔCDF / ΔLERF – Internal Events

RG 1.177 recommends that the ΔCDF and ΔLERF associated with the proposed CT extensions be calculated. A bounding analysis was performed to assess the impact of the proposed CT extensions on the instantaneous CDF and LERF values.

Calculations were based on runs using the PBNP PRA model in a zero test and maintenance condition to establish a baseline CDF. Additional runs were made assuming that a MDAFW Pump was out of service (OOS) to calculate estimates of the instantaneous ΔCDF and ΔLERF associated with the CT increase. The zero test and maintenance model was used because this is a one-time CT extension request and the risk because of concurrent work will be managed. Calculations were performed using the current approved Revision 3.18 version of the PBNP PRA model modified to include more recent plant data from a recently approved data analysis update.

Additionally, a review of the cutset results revealed some conservatisms that were eliminated by taking credit for execution of existing plant procedure steps or by eliminating cutsets that would not lead to core damage based on plant operating and/or simulation experience. The PBNP PRA model runs with a MDAFW Pump out of service were performed for four different cases:

"A" MDAFW Pump out of service from a Unit 1 perspective, "B" MDAFW Pump out of service from a Unit 1 perspective, "A" MDAFW Pump out of service from a Unit 2 perspective and "B" MDAFW Pump out of service from a Unit 2 perspective. The results are shown below in Table 1.

Table 1
Instantaneous ΔCDF and ΔLERF Calculations

Case	Unit 1		Unit 2	
	CDF (per year)	LERF (per year)	CDF (per year)	LERF (per year)
Baseline Risk	1.971E-5	1.971E-6	1.912E-5	1.912E-6
A MDAFW Pump OOS	2.512E-5	2.512E-6	2.616E-5	2.616E-6
B MDAFW Pump OOS	2.905E-5	2.905E-6	2.454E-5	2.454E-6
A MDAFW Pump OOS ΔCDF/ΔLERF	5.41E-6	5.41E-7	7.04E-6	7.04E-7
B MDAFW Pump OOS ΔCDF/ΔLERF	9.34E-6	9.34E-7	5.42E-6	5.42E-7

The maximum increase in Unit 1 CDF was estimated to be 9.34E-06 per year. For Unit 2, the maximum increase in CDF was estimated to be 7.04E-06 per year. The maximum increase in Unit 1 LERF was estimated to be 9.34E-07 per year. For Unit 2, the maximum increase in LERF was estimated to be 7.04E-07 per year.

3.1.1.4 ICCDP / ICLERP – Internal Events

RG 1.177 provides quantitative acceptance guidelines for the risk impact associated with permanent CT changes to be considered small as an ICCDP ≤5.0E-07 and an ICLERP of ≤5.0E-08.

ICCDP and ICLERP are defined below.

ICCDP = [(conditional CDF with the subject equipment out of service) - (baseline CDF with nominal expected equipment unavailabilities)] * (duration of single AOT under consideration).

ICLERP= [(conditional LERF with the subject equipment out of service) – (baseline LERF with nominal expected equipment unavailabilities)] * (duration of single AOT under consideration).

For the purpose of this one-time CT extension request, the additional risk incurred by each unit is the risk increase for each MDAFW Pump replacement for the additional duration of the work activity. For each MDAFW Pump, an additional 9 days of completion time is requested per pump (total of 16 days per MDAFW Pump). The additional risk increase because of this extension is determined in Table 2, based on the information in Table 1 above.

Table 2
ICCDP and ICLERP Calculations for 9-Day Extension

Case	Unit 1		Unit 2	
	ICCDP	**ICLERP**	**ICCDP**	**ICLERP**
A MDAFW Pump OOS	1.33E-07	1.33E-08	1.74E-07	1.74E-08
B MDAFW Pump OOS	2.30E-07	2.30E-08	1.34E-07	1.34E-08

The maximum ICCDP for the MDAFW Pump replacements is 2.30E-07 and occurs for Unit 1 during the replacement of the P-38B MDAFW Pump. The maximum ICLERP for the MDAFW pump replacements is 2.30E-08 and occurs for Unit 1 during the replacement of the P-38B MDAFW Pump. These calculations are based on an additional 9 days of completion time per pump (total completion time of 16 days per MDAFW Pump).

In addition to assessing the risk because of the additional 9 days of completion time, the total risk during the pump replacements is also calculated below. For each MDAFW pump, a total completion time of 16 days is requested per pump. The total risk increase is determined in Table 3, based on the information in Table 2 above.

Table 3
ICCDP and ICLERP Calculations for Entire 16-Day Duration

Case	Unit 1		Unit 2	
	ICCDP	**ICLERP**	**ICCDP**	**ICLERP**
A MDAFW Pump OOS	2.37E-07	2.37E-08	3.09E-07	3.09E-08
B MDAFW Pump OOS	4.09E-07	4.09E-08	2.38E-07	2.38E-08

The maximum ICCDP for the MDAFW pump replacements is 4.09E-07 and occurs for Unit 1 during the replacement of the P-38B MDAFW pump. The maximum ICLERP for the MDAFW Pump replacements is 4.09E-08 and occurs for Unit 1 during the replacement of the P-38B MDAFW pump. These calculations are based on the total duration of the proposed CT (total completion time of 16 days per MDAFW pump).

3.1.1.5 Internal Fire PRA

FPLE-PB is currently developing a full-scope fire PRA as part of their transition to NFPA 805; however, this project is not yet completed. Applicable fire risk insights can still be obtained by reviewing the nature of the fire risk contributors for risk-significant fire zones, as determined in the current Appendix R Safe Shutdown Analysis. A description of Appendix R considerations is provided in the "Defense In Depth Assessment" Section 3.2 of this application.

The following compensatory measures will be implemented based on the IPEEE fire risk insights and Appendix R considerations for fire areas affected by the MDAFW pump being out of service for replacement:

- A roving fire watch touring the seven areas of concern to monitor and ensure that combustible loading, work activities, and other activities that could increase the likelihood of a fire are minimized.

- Initial baseline thermography of potential fire initiators in the seven areas of concern will be performed within seven days prior to starting the modification. The thermography will be repeated weekly thereafter until restoration of the MDAFW pump to service to detect degrading operating equipment.

Based on the compensatory measures to reduce and manage fire risk, the risk impact from fire will be low and controlled.

3.1.1.6 Other External Events

The impact of external events on the increase in risk associated with having either P-38A or P-38B out of service was not explicitly calculated because of the lack of an updated external events PRA model for PBNP. The seismic IPEEE indicated that the risk from seismic events was dominated by loss of offsite power related scenarios and contribution of the AFW system is approximately 3.4%. The impact of the MDAFW CT extension on seismic risk is expected to be low.

3.1.1.7 ΔCDF with Two vs. One Unit On-Line

The change in risk for performing the proposed MDAFW pump replacements during an outage vs. online was also evaluated using WinNUPRA. Table 4 below summarizes the results of the evaluation:

Table 4
Comparison of ΔCDF with Units On Line and Shut Down

	ΔCDF (Unit 1)	**ΔCDF (Unit 2)**
Both units on line:		
A MDAFW PUMP out of service	1.70E-5	2.07E-5
B MDAFW PUMP out of service	2.56E-5	1.70E-5
Unit 1 in MODE 5, 6, or defueled		
A MDAFW PUMP out of service	N/A	1.9E-5
B MDAFW PUMP out of service	N/A	1.54E-5
Unit 2 in MODE 5, 6, or defueled		
A MDAFW PUMP out of service	1.53E-5	N/A
B MDAFW PUMP out of service	2.39E-5	N/A

The difference in the changes in CDF are small (10% or less), and therefore it is concluded that the pump replacement can occur while online or during an outage with no change in the probabilistic conclusions.

3.1.2 Tier 2: Avoidance of Risk Significant Plant Configurations

To minimize the risks caused by removing an MDAFW pump from service for a potentially extended TSAC duration, a multi-aspect risk management approach will be used. Each aspect has one or more supporting actions to drive down the associated risk as follows:

During the MDAFW pump upgrade replacements, no other work that impacts risk will be planned to take place concurrently. Emergent work to assure continued reliability of redundant auxiliary feedwater (AFW) trains will be coordinated and managed using the on-line risk management process. This risk management action was credited in the PRA Insights analysis presented above and is the basis for using the zero-maintenance PRA model in that analysis. The remaining risk management actions described below are qualitative in nature and were not included in the PRA insights analysis.

Risk management actions to increase station personnel awareness will include:

- Redundant operable AFW trains and supporting systems will be protected from inadvertent challenges in accordance with plant procedure NP 2.1.8, “Protected Equipment." This will involve identifying and posting the redundant AFW trains and supporting equipment (and, to the extent practical, a perimeter surrounding them) as “Protected." This prevents unauthorized or unintentional access. Prior authorization from the Operations Shift Manager is required for entry into and work within a Protected Area. In addition, periodic tours of the protected area(s) will be performed and logged by cognizant Operations watch standers to verify the continuing OPERABILITY of the protected equipment.

- Pre-job and pre-shift briefings of implementing work group personnel emphasizing the risk aspects of the planned evolution.

- Pre-shift awareness briefings of the replacement activities with the on-coming operating shift emphasizing current status of the work in progress. For a significant portion of the planned replacement activities (i.e., during post-installation testing), the pump may be made available for use in an emergency.

Risk management actions to minimize the duration of the replacement activity will include:

- 24-hour staffing of the Outage Control Center (OCC) until the MDAFW pump being replaced has been successfully tested and accepted by Operations. As a minimum, the OCC staff will consist of an Outage Shift Manager, Outage Maintenance Manager, Outage Operations Manager, and an Outage Engineering Manager. These personnel shall have the authority to direct station resources as needed to expedite completion of the work and resolve related emergent issues.

- The work will be scheduled and staffed to proceed around the clock without interruption until the affected MDAFW pump being replaced has been successfully tested and accepted by Operations.

- Parts and materials in support of the replacement will be verified to be correct, and will be verified to be on-hand prior to removing the MDAFW pump from service.

- Parts and materials will be pre-staged before needed by the work in progress.

- Parts will be pre-fabricated to the maximum extent practical.

- Parts and equipment will be retained and prepared for re-installation to the extent practical as a recovery contingency.

- Personnel will conduct turnover on-station to minimize down-time between shifts.

- Tagout activities will be pre-planned and the tagout series prepared in advance of removing the MDAFW pump from service.

Risk management actions to ensure OPERABILITY of the remaining unit-specific TDAFW pump systems and MDAFW pump system, the following Technical Specification (TS) surveillance requirements (SR) will be performed prior to and during the MDAFW pump and motor replacement activity as described below:

- OPERABILITY of both unit-specific TDAFW pump systems and the other MDAFW pump system shall be verified within 24 hours prior to making one MDAFW pump INOPERABLE for pump and motor replacement by satisfying TS SR 3.7.5.1. After the initial SR is met, TS SR 3.7.5.1 frequency shall be increased to daily until the newly replaced MDAFW pump is declared OPERABLE:

TS SR 3.7.5.1	Verify each AFW manual, power operated, and automatic valve in each water flow path, and in both steam supply flow paths to the steam turbine-driven pump, that is not locked, sealed or otherwise secured in position, is in the correct position.

- OPERABILITY of both unit-specific TDAFW pump systems and the other MDAFW pump system shall be demonstrated within 72 hours prior to making one MDAFW pump INOPERABLE for pump and motor replacement by satisfying TS SR 3.7.5.2:

TS SR 3.7.5.2	Verify the developed head of each required AFW pump at the flow test point is greater than or equal to the required developed head.

- OPERABILITY of the applicable train specific emergency diesel generators (associated with the OPERABLE MDAFW pump) shall be demonstrated within seven days prior to making one MDAFW pump INOPERABLE for pump and motor replacement by satisfying TS SR 3.8.1.1, 3.8.1.2 and 3.8.1.3:

TS SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each required offsite circuit.
TS SR 3.8.1.2	Verify each standby emergency power source starts from standby conditions and achieves rated voltage and frequency.
TS SR 3.8.1.3	Verify each standby emergency power source is synchronized and loaded and operates for ≥60 minutes at a load ≥2500 kW and ≤2850 kW.

To manage the fire risk due a MDAFW pump being inoperable, procedure OM 3.27, "Control of Fire Protection & Appendix R Safe Shutdown Equipment," will be revised to incorporate additional compensatory measures. These compensatory measures will consist of:

- A roving fire watch touring the seven areas of concern to monitor and ensure that combustible loading, work activities, and other activities that could increase the likelihood of a fire are minimized.

- Initial baseline thermography of potential fire initiators in the seven areas of concern will be performed within seven days prior to starting the modification. The thermography will be repeated weekly thereafter until restoration of the MDAFW pump to service to detect degrading operating equipment.

Risk management actions to maximize the reliability and readiness of the redundant AFW trains during the MDAFW replacement will include:

- Reviewing upcoming preventative maintenance activities for the redundant AFW trains and supporting equipment, and completing them in advance of the planned work to the extent practical.

- Reviewing outstanding corrective work orders on AFW and supporting systems, and completing those that may challenge the reliability and capability of the redundant pumps to complete their design functions prior to removing a MDAFW from service for upgrade replacement (the corrective work orders to upgrade the pumps by replacing them are not subject to this review as it would create an impasse).

- Reviewing open corrective action program (CAP) items on AFW and supporting systems to determine which (if any) could challenge the reliability of the redundant AFW pumps during the replacement OOS period. These will be addressed and corrected commensurate with their safety significance prior to removing an MDAFW pump from service for replacement (the CAP items to replace the MDAFW pumps are not subject to this review as it would create an impasse).

Risk management actions to minimize the likelihood of a demand on AFW will include:

- Planned work in the switchyard and on the internal AC distribution (including protective relaying) that could cause a loss of offsite power to the main feed pumps will not be scheduled for performance during the TSACs. Emergent work to assure continued reliability of offsite power will be coordinated and managed using the on-line risk management process.

3.1.3 Tier 3: Risk-Informed Configuration Risk Management

Tier 3 requires a proceduralized process to assess the risk associated with both planned and unplanned work activities. The objective of the third tier is to ensure that the risk impact of out-of-service equipment is evaluated prior to performing any maintenance activity. As stated in Section 2.3 of RG 1.177, "a viable program would be one that is able to uncover risk-significant plant equipment outage configurations in a timely manner during normal plant operation." The third-tier requirement is an extension of the second-tier requirement, but addresses the limitation of not being able to identify all possible risk-significant plant configurations in the second-tier evaluation. Procedures are in place at PBNP which addresses this objective. Procedure NP 10.3.7, “On-Line Safety Assessment,” is an integral part of the work planning and management process at the plant. The configuration risk management program (CRMP) implemented by NP 10.3.7 ensures that configuration risk is assessed and managed prior to initiating any maintenance activity consistent with the requirements of 10 CFR 50.65(a)(4). The CRMP also ensures that risk is reassessed if an emergent condition results in a plant configuration that has not been previously assessed. Procedure NP 10.3.5, "Risk Monitoring and Risk Management," sets high level requirements for the CRMP and establishes that the Operations Shift Manager has overall responsibility to ensure that risk is assessed and properly managed.

PBNP uses the PRA model-based Safety Monitor software program for assessing the instantaneous risk due to making equipment unavailable for maintenance. Risk assessments are performed by the Production Planning Group using the “Schedule” mode of Safety Monitor at several stages during the scheduling of the work week in accordance with procedure FP-WM-SCH-01, "Online Scheduling Process." Emergent work is assessed for risk impact by the Operations shift crew under the direction of the Shift Manager (SM) using Safety Monitor in the “Real” and “hypothetical” modes.

Under the CRMP as defined in NP 10.3.7 and implemented within Safety Monitor, four risk levels were established to ensure that appropriate risk management activities take place. The four risk levels are:

- GREEN - This level is of low safety significance and corresponds to the "non-risk significant" band for temporary changes in risk in the PSA Applications Guide (EPRI Technical Report TR-105396). The increase in instantaneous risk above the zero maintenance risk level results in a change in core damage probability of less than 1.0E-06 or a change in large early release probability of less than 1.0E-07 if continued over a 7-day time period. This is the lowest on-line risk level. It is expected that the greatest amount of time will be spent at this level. The main concern at this level is to monitor the integrated risk over the long term for indications of a trend. No approvals are required to enter or remain at this level. No additional risk management actions are required. Normal procedural guidance is followed.

- YELLOW - This level is of low to moderate safety significance and is intended to be a warning of increasing risk. This risk band corresponds to an increase in instantaneous risk above the zero maintenance risk level that results in a change in core damage probability of 1.0E-06 or a change in large early release probability of 1.0E-07 if continued over a 2 to 7-day time period. This is the next to lowest on-line risk level. It is expected that the YELLOW risk level will be entered often for planned maintenance. However, this level is an indication that the long-term impact of frequent YELLOW level entries needs to be monitored to ensure that the assumptions in the PRA for equipment availability are not exceeded. The SM reviews and approves pre-planned entries into the YELLOW on-line risk level via Operations participation in the normal planning and scheduling process. When an unplanned entry into a YELLOW risk level occurs, the SM approves any plans to remain at this level. An entry into the shift log is made to document this approval. The SM should ensure risk significant activities are understood by involved personnel. Contingency plans should be considered for this risk level and documented in the shift log. (Risk management concepts are discussed in Attachment D of NP 10.3.7.)

- ORANGE - This level is of moderate safety significance. The increase in instantaneous risk above the zero maintenance risk level results in a change in core damage probability of more than 1.0E-06 or a change in large early release probability of more than 1.0E-07 if continued over a 2-day time period. This is the highest of the normal on-line risk levels. It is expected that the ORANGE risk level will be entered occasionally for planned maintenance. However, this level is an indication that the long-term impact of even moderately frequent ORANGE risk level entries needs to be monitored to ensure that the assumptions in the PRA for equipment availability are not exceeded. The Plant Manager or his designee approves any pre-planned entry into the ORANGE risk level. When an unplanned entry into an ORANGE risk level occurs, the Plant Manager or his designee approves any plans to remain at this level using form PBF-9814, "Risk Management Actions for Entry into an ORANGE or RED Risk Level." Evaluation and implementation of risk management concepts are also documented on this form.

- RED - This level is of high safety significance and represents an upper limit for instantaneous risk from NUMARC 93-01 (core damage frequency of 1.0E-03). RED is the highest on-line level and is a concern over the short term (matter of hours). It is expected that this level will be entered voluntarily under only the most unusual circumstances, and then only for a very short period of time, and with a clear understanding of which events cause this risk level. The Plant Operations Review Committee is required to review and approve a pre-planned entry into the RED risk level. When an unplanned entry into a RED risk level occurs, the Plant Manager or his designee shall approve any plans to remain at this level using form PBF-9814. Evaluation and implementation of risk management concepts are also documented on this form.

Finally, if a monitored activity in a GREEN risk level (CDF or LERF) is expected to exceed 7 days in actual duration, or if any monitored activity or combination of monitored activities results in a YELLOW risk level (CDF or LERF) is expected to exceed 2 days in actual duration, then further evaluation of the cumulative risk impact is required. This activity is documented using form PBF-9815, "Evaluation of Integrated Risk Impact."

During the MDAFW pump replacement activity with no other risk affecting equipment being unavailable concurrently as is now planned, Safety Monitor shows that both units will be low in the YELLOW risk level.

3.1.3.1 Maintenance Rule Program

To ensure the proposed extension of the MDAFW pump CT does not degrade operational safety over time, the Maintenance Rule (MR) requires an evaluation when equipment covered by the MR does not meet its performance criteria. The reliability and availability of the AFW Pumps are monitored under the MR program. If the pre-established reliability or availability performance criteria are exceeded for the AFW Pumps, they are considered for 10 CFR 50.65 (a)(1) actions. These actions require increased management attention and goal setting to restore their performance to an acceptable level.

Between January 2006 and December 26, 2007, eleven (11) Maintenance Rule Evaluations (MREs) were completed for conditions identified on the PBNP AFW pumps. Each of these concluded that the identified condition was not a maintenance rule functional failure. The 2-year rolling unavailability for the pumps is summarized in Table 5 below.

Table 5
24-Month Rolling Unavailability for AFW Pumps

Pump	Unavailability (hrs)
1P-29 (Unit 1 TDAFWP)	161
2P-29 (Unit 2 TDAFWP)	155
P-38A (“A” MDAFWP) to Unit 1	60
P-38A (“A” MDAFWP) to Unit 2	58
P-38B (“B” MDAFWP) to Unit 1	53
P-38B (“B” MDAFWP) to Unit 2	54

The AFW system is currently in status a(1) due to TDAFW pump unavailability in excess of the goal of 110 hrs/24 months. The Unit 1 TDAFW pump unavailability is attributable to extensive troubleshooting of a high turbine bearing temperature condition following the 10 year overhaul of the turbine in the spring of 2007. The Unit 2 TDAFW pump unavailability is attributable to extensive troubleshooting of moisture in the turbine oil during 2007. Both conditions have been resolved. The 10-year overhaul of the Unit 2 TDAFW pump turbine was performed in the fall of 2006.

3.2 Defense-In-Depth Assessment

3.2.1 Design Basis Accident Mitigation Capability and Radiological Impact

The two-unit design for PBNP confines the location of a reactor fault condition to one of the two units at any time. Thus, the potential consequences of each and every credible reactor fault condition are no different than those for a single unit plant. An exception to this single unit plant position is taken for possible faults arising in the electrical grid system to which both units are connected. It is possible that the Loss of External Electrical Load (PBNP FSAR 14.1.9) or the Loss of All AC Power to the Station Auxiliaries (PBNP FSAR 14.1.11) could affect both units simultaneously. The AFW design is such that the occurrence of either of these two transients, in both units simultaneously, can be accommodated without an unsafe condition arising in either unit.

As described in the PBNP FSAR, the AFW system performs four safety-related functions. These functions are evaluated in the following sub-sections:

3.2.1. Start And Deliver Flow to Support Decay Heat Removal

The AFW system shall automatically start and deliver adequate AFW system flow to maintain adequate steam generator levels during accidents which may result in main steam safety valve opening. Such accidents include: Loss of Normal Feedwater (LONF) (PBNP FSAR 14.1.10), and Loss of All AC Power to the Station Auxiliaries (LOAC) (PBNP FSAR 14.1.11) events.

To meet the design basis required in the LONF/LOAC analysis, the AFW system is required to provide 200 gpm of flow either to one steam generator or split between two steam generators within 5 minutes following receipt of a low-low steam generator water level setpoint signal.

For the PBNP FSAR Chapter 14 LONF/LOAC analyses, the most conservative case is calculated to ensure a bounding analysis result. The LONF analysis assumes that the AFW system provides only 200 gpm of flow split to two steam generators. This is an analytical limitation that is not derived from current plant equipment alignments and procedures. Only the MDAFW pumps are physically limited in flow to ~200 gpm (the TDAFW pumps can achieve ~400 gpm). Flow from the MDAFW pumps cannot be split to the two steam generators on a single unit without opening local manual isolations between the two MDAFW pumps. This would violate train separation, and use of the cross connects is not directed for the procedures that would be used to mitigate LONF or LOAC events. Therefore, while the analytical assumption is conservative, it does not reflect the actual plant configuration.

The assumption of split flow is slightly more conservative than 200 gpm of flow to a single steam generator. No credit is taken for AFW flow from the unit-specific turbine-driven pump or a second motor-driven pump. The LOAC analysis assumes the auxiliary AFW system provides only 200 gpm of flow to a single steam generator. This is consistent with operation of only a single MDAFW PUMP to the one unit.

Deterministic Analysis:

During the time that one MDAFW pump is inoperable for pump and motor replacement, both unit-specific TDAFW pump systems and the other in-service MDAFW pump system will be operable. Should an additional AFW pump become inoperable, TSAC 3.7.5.D.1 requires that the affected unit(s) be placed in MODE 3 within 6 hours (12 hours if both units are affected and the transition is performed sequentially), followed by a transition to MODE 4 within 18 hours (unless both MDAFW pumps are inoperable).

The multiple redundancies of the AFW system ensures that flow greater than or equal to the minimum analyzed capacity of 200 gpm per unit will be available in the event of a postulated single unit LONF event, or a postulated dual unit LOAC.

If an additional AFW pump failure occurred:

- If the remaining (in-service) MDAFW pump fails, then the remaining TDAFW pump systems are capable of providing 200 gpm per steam generator per unit. This is twice the flow assumed by the analyses.

- If one of the unit-specific TDAFW pumps fails, then the remaining unit-specific TDAFW pump system is capable of providing 200 gpm per steam generator to a single unit, and the remaining in-service MDAFW pump system is capable of providing the credited 200 gpm to a single steam generator on the other unit.

Radiological Impact:

Because the LONF/LOAC analyses do not result in an adverse condition in the core, there are no radiological consequences calculated in the current license basis. Extending the CT for an MDAFW pump out of service would not affect the bases for not performing a radiological analysis for these postulated events.

3.2.1.2 Start and Deliver Flow in Support of Rapid Cooldown

The AFW system shall automatically start and deliver sufficient AFW system flow to maintain adequate steam generator levels during accidents which require rapid reactor coolant system cooldown to achieve the cold shutdown condition within the limits of the analysis. Such accidents include; steam generator tube rupture (SGTR), (PBNP FSAR 14.2.4), and rupture of a steam pipe (MSLB), (PBNP FSAR 14.2.5). For these accidents, minimum auxiliary feedwater assumptions are not specified and auxiliary feedwater isolation to the affected steam generator is assumed (PBNP FSAR 10.2).

Deterministic Analysis:

During the time that one MDAFW pump is inoperable for pump and motor replacement, both unit-specific TDAFW pump systems and the other in-service MDAFW pump system will be operable. Should an additional AFW pump become inoperable, TSAC 3.7.5.D.1 requires that the affected unit(s) be placed in MODE 3 within 6 hours (12 hours if both units are affected and the transition is performed sequentially), followed by a transition to MODE 4 within 18 hours (unless both MDAFW pumps are inoperable).

As discussed previously for the LONF and LOAC transients, a single MDAFW pump is sufficient to stabilize the plant in MODE 3 without filling the pressurizer solid caused by RCS heatup. However, the margin available with a single MDAFW pump is minimal, and it is apparent from the curves of steam generator level, RCS temperature and pressurizer level that accompany the LONF and LOAC analyses, that additional pumping capacity would be required to mitigate the SGTR or MSLB events. This is because the SGTR and MSLB events require a rapid cool down in addition to meeting the demands of decay heat removal.

An analysis of a steam generator tube rupture established that the average AFW flow needed to complete the initial cooldown during the first 30 minutes of a SGTR event is 37.55 lb/second. This equates to:

$$37.55 \text{ lb/sec} \times 60 \text{ sec/min} \times 7.48 \text{ gal/ft}^3 / 62.4 \text{ lb/ft}^3 = 270 \text{ gpm}$$

This is in excess of the capability of a single MDAFW pump, and therefore the TDAFW pump (with a 400 gpm capacity) is needed to mitigate such events if a single MDAFW pump is unavailable.

In addition to the larger pumping capacity, the TDAFW pump has the advantage over the remaining MDAFW pumps of being able to feed water to either or both of the steam generators. Its use is therefore independent of which steam generator has suffered a failure (whether a MSLB or a SGTR).

The initiating event frequency of SGTR is low at approximately 5.7E-4 per year per SG. This is based on a generic probability for the failure of replacement SG U-tubes (Reference WCAP-15955). The conditional LOOP probability is approximately 3.0E-3, and the probability of a random failure of the Turbine-Driven AFW pump failing to start is approximately 1.36E-2. The probability of these events all occurring during the same time as the MDAFW pump replacements is very low as shown below:

5.7E-4/yr-SG*2SG*3.0E-3*1.36E-2*16 days/pump*2 pumps / 365 days/yr ≈ 4.1E-9

The total MSLB initiating event frequency (considering both inside and outside containment breaks) is approximately 1.44E-2/yr. This figure is conservative because MSLBs downstream of the main steam isolation valves (MSIVs) would be mitigated by MSIV closure. The probability of an MSLB concurrent with a LOOP and failure of a TDAFW pump to start during the 16-day MDAFW pump replacement duration is then:

1.44E-2 /yr * 3.0E-3 * 1.36E-2 * 16 days/pump * 2 pumps / 365 days/yr ≈ 5.2E-8

These low probabilities of occurrence demonstrate that the risk associated with removing the MDAFW pumps from service sequentially for the period proposed to support upgrading the pumps is acceptable.

<u>Radiological Impact:</u>

Since there is confidence that the AFW functions credited in the license basis analyses of SGTR and MSLB will be available, the radiological analyses would not be affected. The existing license basis radiological analyses remain bounding.

There is further assurance of the acceptability of the proposed extended CT duration embodied in the license basis radiological analyses of both the SGTR and MSLB events. Those analyses assume that the pre-accident primary to secondary steam generator tube leakage of 500 gallons per day into each intact steam generator. This is the source of the continuing release during the evaluated long-term cool downs, and is more than three times the maximum permissible leakage of 150 gpd per steam generator (TS LCO 3.4.13).

The actual primary-to-secondary leakage of the PBNP steam generators is orders of magnitude below these values. The Unit 1 primary to secondary leakage has been stable in the range of 0.1 to 0.4 gpd since it was first detected after the spring 1991 refueling outage, and Unit 2 primary-to-secondary leakage has been less than detectable since the steam generators were replaced in 1996.

This low primary-to-secondary leakage provides additional assurance that, even should a SGTR event occur, and the cool down is prolonged because of a diminished AFW pumping capacity (i.e., an additional AFW pump failure), the increased duration of the cool down will not result in the radiological consequences exceeding those previously analyzed because of the continued dumping of steam from an intact steam generator with pre-existing leakage.

3.2.1.3 Isolation of Ruptured or Faulted Steam Generator

The AFW system shall be capable of isolating the AFW steam and feed water supply lines from the ruptured or faulted steam generator following a SGTR or MSLB event. The SGTR accident assumes that steam from the ruptured SG is isolated and AFW to the affected SG is secured within 30 minutes. The MSLB accident assumes that AFW flow to the faulted steam generator is terminated within 10 minutes.

Reducing the available AFW pumping capacity by removing a single MDAFW pump from service does not affect the ability to isolate AFW flow to or steam supply from the affected steam generator.

Deterministic Analysis:

During the time that one MDAFW pump is inoperable for pump and motor replacement, no activity related to the pump and motor replacement will prevent the isolation of AFW steam and feedwater supply lines from a ruptured or faulted steam generator following a SGTR or MSLB event.

Radiological Impact:

The activities associated with MDAFW pump replacement will not affect ability to manually isolate AFW steam supplies from and AFW flow delivered to the affected SG following a SGTR or MSLB event. Therefore, the associated radiological analyses and their consequences are not affected by the isolation function during the replacements.

3.2.1.4 Seismic

The safety-related portions of the AFW system are designed as Seismic Class I, and are capable of withstanding design basis earthquake (DBE) accelerations without a loss of system performance capability.

Deterministic Analysis:

During the time that one MDAFW pump is inoperable for pump and motor replacement, no activity related to the pump and motor replacement will degrade the seismic qualification of either unit-specific TDAFW pump system or the other in-service portions of the AFW system.

Radiological Impact:

There is no radiological impact associated with DBE as described in the PBNP license basis. Since the seismic qualification of the AFW system will be maintained during the MDAFW pump replacement activities, there will not be a radiological impact.

Conclusion

With one MDAFW pump out of service for replacement, the PBNP design for AFW remains capable of providing adequate AFW flow to meet the worst-case demands of each analyzed license basis accident that credits AFW provided that no additional failures occur that further reduce AFW flow capacity. This is consistent with single failure assumptions during a TSAC. For two of the analyzed events (LONF and LOAC), an additional AFW pump failure can be tolerated and the license basis analysis still remains valid and bounding.

3.2.2 Beyond Design Basis Events

The AFW system also performs three augmented quality functions as described in FSAR 10.2. The three functions are evaluated in the following subsections.

3.2.2.1 Station Blackout

In the event of a station blackout, only the turbine-driven pumps would be capable of automatically supplying sufficient feedwater to remove decay heat from both units without reliance on AC power for one hour. The steam supply and AFW discharge valves are powered from diverse sources of vital 125 V DC. Cooling water for the pump and turbine bearings can be supplied from the diesel driven firewater pump. The Technical Specification minimum amount of water in the condensate storage tanks, 13,000 gallons per operating unit, provides adequate makeup to the steam generators to maintain each unit in a hot shutdown condition for at least one hour concurrent with a loss of all AC power.

This capability is not affected by a MDAFW pump out of service to replace the pump and motor.

3.2.2.2 Anticipated Transient Without Scram (ATWS)

In the event of an ATWS, the AFW system shall be capable of automatic actuation by use of equipment that is diverse from the reactor trip system. This is accomplished by the AMSAC system described in PBNP FSAR 7.4.

The ATWS circuitry is not affected by removing one MDAFW pump from service. A review of the applicable Westinghouse generic ATWS rule compliance document (WCAP-11993) found that its basis for concluding that there is a reasonable assurance of safety is a probabilistic evaluation. Among the inputs used to determine the probability of a Westinghouse PWR suffering a serious ATWS event are the joint probabilities of a failure of the reactor to scram from different power levels and with 100% or 50% AFW flow. These factors are incorporated into the PRA model.

3.2.3.3 Severe Weather

Severe weather concerns for the PBNP site are limited to high winds, low temperatures and/or heavy snow loads. Any of these could have an adverse impact of offsite power availability, and none can be reliably forecast more than a few days in advance. While the scheduled replacements are anticipated to occur in the fall of 2008 (which would preclude heavy snow loads or low temperatures), the requested change encompasses a 12-month period to accommodate contingencies. Therefore, high winds, heavy snow loads, or severe cold are conditions that might be encountered during the MDAFW pump replacements.

As previously discussed in Section 3.2, with a single MDAFW pump removed from service, the station response to a loss of offsite power will be limited to that previously evaluated in the FSAR. Therefore, no additional compensatory measures are indicated for that eventuality.

The existing plant abnormal operating procedure for severe weather (AOP 13C) is entered upon receipt of a storm warning, frequent field forcing alarms, winds in excess of 35 mph, forecast of actual rapid and/or heavy snow accumulation, temperatures ≤ -5°F, or an actual tornado sighting. The procedure provides direction for securing the site to the extent possible against the specific severe weather threat.

3.2.2.4 Fire Protection

In the event of plant fires, including those requiring evacuation of the control room, the AFW system shall be capable of manual initiation to provide feed water to a minimum of one SG per unit at sufficient flow and pressure to remove decay and sensible heat from the reactor coolant system over the range from hot shutdown to cold shutdown conditions. The AFW system shall support achieving cold shutdown within 72 hours.

A review of the PBNP safe shutdown analysis was performed to determine the potential fire risk contributors associated with the proposed one-time extension of the CT of TSAC 3.7.5.C for replacement of the MDAFW pumps at PBNP.

For safe shutdown purposes, the MDAFW pump function is to provide secondary cooling water to the steam generators for decay heat removal. There are two MDAFW pumps, P-38A and P-38B, which are shared by both units. One pump normally supplies the A SG of both units (1/2HX-1A), while the other supplies the B SG of both units (1/2HX-1B).

In addition to the MDAFW pumps, two unit-specific TDAFW pumps, 1P-29 and 2P-29, are available to supply feedwater to either or both of the steam generators of the associated unit. A single AFW pump (whether motor-driven or steam-driven) is capable of supplying the necessary feed water for decay heat removal and cool down of one unit.

The auxiliary feedwater pump rooms (Fire Area A23S and A23N) each contain one motor-driven and one turbine-driven pump. The two rooms are separated by a 3-hour rated fire barrier to ensure that fire damage in one AFW pump room is limited to the equipment (including two AFW pumps) in that room.
To determine the fire risk associated with having one MDAFW pump out of service for an extended period of time, the Fire Protection plan was reviewed. The Fire Protection program at

PBNP was developed to provide assurance, through a defense-in-depth approach, that a single fire does not impair the safe operation or the safe shutdown capability of the plant. This defense-in-depth fire protection program consists of prevention, detection, suppression, and mitigation elements that form a comprehensive approach to fire protection. The program has both programmatic and plant fire protection equipment and systems. It also includes the Safe Shut Down (SSD) analysis to demonstrate the plant's SSD capability in the event of a fire.

Plant fire areas were reviewed to identify areas where the current SSD analysis for a unit is dependent on the operation of a MDAFW pump only. This review identified seven fire areas where a fire concurrent with a MDAFW pump being unavailable because of extended replacement activities could result in no AFW pump being available to provide decay heat removal.

A listing of potential fire initiators had previously been developed by the station NFPA 805 transition working group using the guidance of NUREG/CR-6850. The station Safe Shutdown Engineer and the station Thermographer walked down the seven areas of concern to assess accessibility and the viability of condition monitoring using thermography. Additional components were added to the list if they were in the same immediate area, were accessible, and it was apparent that they contain electrical power, regardless of whether they met the criteria of NUREG/CR-6850 for potential ignition sources.

A matrix of the potential ignition sources, their locations, and other fire protection considerations (combustible loading, detection, and suppression capability) was compiled. This information was used to develop viable compensatory measures to manage the fire risk with an unavailable MDAFW pump. The matrix, including the associated compensatory measures, is summarized in Table 6. Because of unit-specific considerations, many of the compensatory measures are not required when one of the units is shut down. These outage-dependent compensatory measures are noted in the table.

Table 6
Fire Risk Compensatory Measures with INOPERABLE MDAFW Pump

Fire Areas (zones) dependent on MDAFW pumps	Location	Combustible Loading	Suppression	Detection	Potential Fire Initiators (See Table 7 for the noun names of these potential initiators)	OPERABLE AFW Pumps	Compensatory Measures
A01/B-46 (237)	Auxiliary Building 46’ CC Heat Exch. Room	Low	N	Y	1B-31, 2B-31, P-135	P38A & P38B	1 & 2**
A02 (151)	Safety Injection /Containment Spray Pump Room	Low	Y	Y	1(2)P-14A(B), 1(2)P-15A(B), C901, 1(2)RK-76, 1(2)RK-77	P38B & 2P29	1***
A15 (166)	2B32 Motor Control Center Area	Low	Y*	Y	2B337A-B957B, 2N-04, 2N-11, 2Y-11, B855C, B957B, B958C, HTPC, D-31, D-41, B-44, 2B-32, P-92A, P-92B, 2P-49, X-709A, 2P-2C-Z, 1C-189, 2C-189	P38B & 2P29	1 & 2***
A23N (304N)	Auxiliary Feed Pump Room - North	Low	Y	Y	1SMS-2020, 1SAF-4000, 2C-144, 2C-208C, 2C-208A, 2C-208B, N-02, 2N-03, 2RK-38, 2SAF-4000, 2SMS-2020, B29-SW-4478, C-207, C-715B, NSW-4478, 2C-197, 2SMS-2082, 2P-29, P-38B,W-46, 2Z-104B	1P29 & P38A	1 & 2****
A23S (304S)	Auxiliary Feed Pump Room - South	Low	Y	Y	1C-144,1C-205, 1C-208A, 1C-208B, 1C-208C, 1N-03, 1RK-38, 1SAF-4001, 1SMS-2019, 1SMS-2082, 2C-205, 2SAF-4001, 2SMS-2019, C-715A, N-01, 1C-197, 1P-29, P-38A, W-46A, 1Z-104A	P38B & 2P29	1 & 2***
A25 (306)	D06 Battery. Room	Low	Y	Y	D06	P38A & 2P29	1 & 2***
A26 (307)	D05 Battery Room	Low	Y	Y	D05	P38B & 2P29	1 & 2***

* Partial suppression - a portion of the room does not have sprinkler coverage
** No compensatory measures needed when either unit is in Mode 5, 6, or defueled
*** No compensatory measures needed when Unit 1 is in Mode 5, 6, or defueled
**** No compensatory measures needed when Unit 2 is in Mode 5, 6, or defueled

Compensatory Measures:

1. A roving fire watch touring of the seven areas of concern.
2. Baseline and weekly thermography of operating potential fire initiators in the seven areas of concern.

Table 7

Equipment Noun Names for Table 6

Located in Fire Area A01/B-46

1(2) B-31	480 V Motor Control Centers
P-135	Waste Distillate Pump

Located in Fire Area A02

1(2)P-14A(B)	Containment Spray Pumps
1(2)P-15A(B)	Safety Injection Pumps
C901	El 8' Primary Auxiliary Building South Fire Detection Annunciator Panel
1(2)RK-76	1(2)P-14A/B Containment Spray Pump Seal Water Heat Exchanger Component Cooling Flow Instrument Racks
1(2)RK-77	1(2)P-15A/B Safety Injection Pump Seal Water Heat Exchanger Component Cooling Flow Instrument Racks

Located in Fire Area A15

2B337A-B957B	Unit 2 "A" Charging Pump Normal/Alt Transfer Switches
2N-04	Unit 2 Charging Pump/Pressurizer Heater/Letdown Isolation Local Control Station
2N-11	Unit 2 Charging Pump/Pressurizer Heater Local Control Station
2Y-11	Unit 2 White Instrument Distribution Panel
B855C	1P-11A/B Component Cooling Water Pumps A&B Alternate Power Disconnect Switch
B957B	2P-2A Charging Pump Alternate Power Selector Switch
B958C	2P-11A/B Component Cooling Water Pumps Alternate Power Disconnect Switch
HTPC	Primary Auxiliary Building AH Heat Tracing Panel
D-31	125 V DC Distribution Panel
D-41	125 V DC Distribution Panel
B-44	480 V Motor Control Center for Cryogenic Unit
2B-32	480 V Motor Control Center Primary Auxiliary Building Safeguards
P-92A	Primary Auxiliary Building North Sump Pump ("A")
P-92B	Primary Auxiliary Building North Sump Pump ("B")
2P-49	Blowdown Pump
X-709A	Primary Auxiliary Building HTPC AH Heat Tracing Panel Transformer
2P-2C-Z	Unit 2 "C" Charging Pump Varidrive
1C-189	1T-12 Component Cooling Surge Tank Control Panel
2C-189	2T-12 Component Cooling Surge Tank Control Panel

Located in Fire Area A23N

1SMS-2020	1- HX-1A (Unit 1 "A" Steam Generator) Header to 1P-29 TDAFW Pump Steam Supply MOV Starter
1SAF-4000	1P-29 TDAFW Pump Discharge to Unit 1 "B" Steam Generator AFW Isolation MOV Starter
2C-144	2MS-2090 Unit 2 TDAFW Pump Bearing Cooling Inlet (Service Water) Isolation Valve Control Panel
2C-208C	Unit 2 Source Range Preamplifier Panel
2C-208A	Unit 2 Source Range Monitoring Processor Panel
2C-208B	Unit 2 Source Range Output Expansion Panel
N-02	Safeguards Equipment Local Control Station
2N-03	Unit 2 Safeguards Equipment Local Control Station
2RK-38	AFW Pump Local Instrumentation Rack

Located in Fire Area A23N (Continued)

2SAF-4000	2P-29 TDAFW Pump Discharge to Unit 2 "B" Steam Generator Inlet Isolation MOV Starter
2SMS-2020	Unit 1 "A" Steam Generator Header to 1P-29 TDAFW Pump Steam Supply MOV Starter
B29-SW-4478	SW-4478 Service Water to Water Treatment Supply Disconnect Switch
C-207	Alternate Shutdown Inverter A/B Instrument Panel
C-715B	2Z-104B Unit 2 Turbine Building Service Water Zurn Strainer Control Panel
NSW-4478	SW-4478 Service Water Supply to Water Treatment Plant Isolation Valve Local Control Station
2C-197	2P-29 Unit 2 TDAFW Pump Suction Pressure Trip Control Panel
2SMS-2082	2P-29 Unit 2 TDAFW Pump Trip & Throttle Valve MOV Starter
2P-29	Unit 2 Turbine Driven Auxiliary Feed Water Pump
P-38B	"B" Motor Driven Auxiliary Feedwater Pump
W-46	AFW Pump and Vital Switchgear Rooms Cooling Fan
2Z-104B	Unit 2 Turbine Building Service Water Zurn Strainer

Located in Fire Area A23S

1C-144	1MS-2090 Unit 1 TDAFW Pump Bearing Cooling Inlet (Service Water) Control Panel
1C-205	Unit 1 Safe Shutdown Control Panel
1C-208A	Unit 1 Source Range Monitoring Processor Panel
1C-208B	Unit 1 Source Range Output Expansion Panel
1C-208C	Unit 1 Source Range Preamplifier Panel
1N-03	Unit 1 Safeguards Equipment Local Control Station
1RK-38	Unit 1 AFW Pump Local Instrumentation Rack
1SAF-4001	1P-29 Unit 1 TDAFW Pump Discharge to Unit 1 "A" Steam Generator Inlet Isolation MOV Starter
1SMS-2019	Unit 1 "B" Steam Generator Header to Unit 2 TDAFW PUMP Steam Supply MOV Starter
1SMS-2082	Unit 1 TDAFW Pump Trip & Throttle Valve MOV Starter
2C-205	Unit 2 Safe Shutdown Control Panel
2SAF-4001	Unit 2 TDAFW Pump Discharge to Unit 2 "A" Steam Generator Inlet Isolation MOV Starter
2SMS-2019	Unit 2 "B" Steam Generator Header to Unit 2 TDAFW PUMP Steam Supply MOV Starter
C-715A	1Z-104A Unit 1 Turbine Building Service Water Supply Zurn Strainer Control Panel
N-01	Safeguards Equipment Local Control Station
1C-197	Unit 1 TDAFW Pump Suction Pressure Trip Control Panel
1P-29	Unit 1 Turbine Driven Auxiliary Feedwater Pump
P-38A	"A" Motor Driven Auxiliary Feedwater Pump
W-46A	AFW Pump and Vital Switch Gear Rooms Cooling Fan "A"
1Z-104A	Turbine Building Service Water Supply Zurn Strainer

Located in Fire Area A25

D06	125 V DC Station Battery

Located in Fire Area A26

D05	125 V DC Station Battery

All seven of these FAs have automatic fire detection capabilities to provide early identification of a fire. All seven FAs have low combustible loadings.

Five of the FAs have full automatic fire suppression capabilities. FA A15 has partial automatic fire suppression capabilities and FA A01/B-46 does not have an automatic fire suppression capability. Automatic fire suppression will act to limit the fire spread and amount of fire damage.

To manage the fire risk due a MDAFW pump being unavailable, compensatory measures in accordance with a revision of OM 3.27, "Control of Fire Protection & Appendix R Safe Shutdown Equipment," will be initiated. These compensatory measures will consist of:

A roving fire watch touring the seven areas of concern to monitor and ensure that combustible loading, work activities, and other activities that could increase the likelihood of a fire are minimized.

Initial baseline thermography of potential fire initiators in the seven areas of concern will be performed within seven days prior to starting the modification. The thermography will be repeated weekly thereafter until restoration of the MDAFW pump to service to detect degrading operating equipment.

Based on this analysis and completion of the recommended compensatory measures, the increase in fire risk associated with extending the CT is low.

3.3 Safety Margin Assessment

As discussed in the previous section, the AFW system will be capable of performing its credited design basis functions during the period that a single MDAFW PUMP is out of service for replacement with an upgraded pump. For two of the design basis accidents (LONF or LOAC), an additional single failure can be sustained by the system, and the credited safety functions can still be accomplished as described in the current license basis.

The two remaining design bases accidents (SGTR and MSLB) can also be mitigated as described in the current license basis analyses provided that no additional single failure to redundant equipment occurs. To minimize the likelihood of such a failure occurring, surveillance testing of the AFW pumps to remain in service will be performed immediately prior to removing a MDAFW pump from service for upgrading.

In addition, appropriate compensatory measures to reinforce the prevention and detection components of fire protection will be implemented to minimize the potential for a disabling fire in the limited number of areas where a large fire could disable the remaining installed AFW pumps.

The other design functions of AFW (e.g. ability to isolate a faulted steam generator, and automatically actuating to provide AFW flow in an ATWS event) will not be affected by the proposed extension of the existing TS Completion Time.

Based on these considerations, the reduction in safety margin from a one-time extension of the Technical Specification Completion Time to expedite upgrading of the MDAFW pumps is minimal. To quantify the degree of reduction, a risk informed approach was used.

RG 1.177 provides quantitative acceptance guidelines for the risk impact associated with permanent CT changes to be considered small as an ICCDP ≤5.0E-07 and an ICLERP of ≤5.0E-08. The ICCDPs and ICLERPs calculated for each MDAFW Pump for the proposed one-time CT extension are provided in Tables 2 and 3 for Internal Events. The calculated values for ICCDP and ICLERP were determined for the 9-day extension in the CT for each pump and for the total CT of 16-days per pump. Each of the values calculated for ICCDP and ICLERP are below the respective RG 1.177 values representing a small risk impact.

For the 9-day extension in the CT for each pump, the maximum ICCDP for the MDAFW pump replacements is 2.30E-07 and occurs for Unit 1 during the replacement of the P-38B MDAFW pump. The maximum ICLERP for the MDAFW pump replacements is 2.30E-08 and occurs for Unit 1 during the replacement of the P-38B MDAFW pump. These calculations are based on an additional 9 days of completion time per pump (total completion time of 16 days per MDAFW pump).

For the total duration of the proposed CT (total completion time of 16 days per MDAFW pump), the maximum ICCDP for the MDAFW pump replacements is 4.09E-07 and occurs for Unit 1 during the replacement of the P-38B MDAFW pump. The maximum ICLERP for the MDAFW pump replacements is 4.09E-08 and occurs for Unit 1 during the replacement of the P-38B MDAFW pump. These calculations are based on the total duration of the proposed CT (total completion time of 16 days per MDAFW pump).

3.5 Conclusions

An evaluation was performed to review the license and design bases of the AFW system to determine the potential adverse impacts resulting from extending the duration of the 7-day CT for a single MDAFW pump inoperable.

The evaluation has shown that, provided no other single failure of a redundant AFW system component (e.g. an AFW pump) occurs, license bases accident mitigation capability would be maintained.

The evaluation considered the potential consequences of a fire with one MDAFW pump out of service. The evaluation determined that the increased fire risk can be mitigated by implementing additional compensatory measures to reinforce prevention of fires in critical areas. Those compensatory measures are tabulated in the text of the evaluation.

The evaluation concluded that the increase in CDF, LERF, ICCDP, and ICLERP are acceptable for the duration evaluated. The additional risk incurred by each unit from the MDAFW Pump replacements during an extended CT of 16 days per pump was evaluated. The calculated values for ΔCDF / ΔLERF and ICCDP / ICLERP for each MDAFW pump out of service for a total duration of 16 days per pump, fall within the guidance in RG 1.177. Therefore, the risk impact of the proposed CT extensions is small.

The evaluation determined that the work can be performed on line without a significant increase in risk to the health and safety of the public. Compensatory measures will be implemented to ensure maximum reliability of the redundant components, and to minimize the potential of a disabling fire that could seriously degrade AFW capability during the proposed on line work.

3.6 Satisfaction of RG 1.177 Key Principles

One acceptable approach for making risk-informed decisions about proposed TS changes, including both permanent and temporary TS changes, is to show that the proposed changes meet the five key principles stated in RG 1.177, Section B. This submittal has shown that the five key principles are met as summarized below:

1. The proposed change meets the current regulations unless it is explicitly related to a requested exemption or rule change.

   Regulatory Position 2.1 of RG 1.177, "Compliance with Current Regulations" references 10 CFR 50.36, "Technical Specifications." The applicable requirement of that regulation is (d)(2)(ii)(C) which requires a Limiting Conditions for Operation (LCO) for a structure, system, or component (SSC) that is part of the primary success path and which functions to mitigate a design basis accident or transient. The AFW system and subcomponents are subject to this regulation. The requested change complies with the regulation in that the existing LCO for AFW would not be deleted.

2. The proposed change is consistent with the defense-in-depth philosophy.

   The proposed change is consistent with this key principle as discussed in Sections 3.1, 3.2 and 3.3 of this enclosure. The defense in depth will be maintained by combinations of installed design redundancy, programmatic controls and compensatory measures.

3. The proposed change maintains sufficient safety margins.

   The proposed change for a one-time extension of the TS allowable completion time does not affect the AFW systems compliance with applicable design codes and standards because the design is not a function of TS allowable Completion Time. Additionally, during the performance of the planned replacements, the portions of the AFW system that will remain in service will retain their design capabilities and qualifications.

   As discussed in Section 3.2 of this enclosure, the FSAR analysis acceptance criteria can still be met during the proposed extended Completion Time.

   Therefore, the proposed change retains sufficient safety margins.

4. When proposed changes result in an increase in core-damage frequency (CDF) or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.

   As discussed in Section 3.1 of this enclosure, the incremental conditional core damage probability and incremental conditional large early release probability resulting from the proposed change will be small, meet the quantitative acceptance criteria, and are consistent with the expressed intent of the Commission's Safety Goal Policy Statement as contained in RG 1.177. Specifically:

   - The PRA assessment complements and supports the deterministic approach described in Section 3.2 of this enclosure.
   - The PRA analyses is being used as a practical assessment to reduce conservatism that could, if left in place, compel an unplanned shutdown (and the associated increased risk) due to expiration of an existing TS Completion Time during a specific planned upgrade to improve AFW system capabilities.
   - The PRA analysis is as realistic as practicable. Docketing of this submittal makes it publicly available for review.

5. The impact of the proposed change should be monitored using performance measurement strategies.

   As discussed in section 3.1 of this enclosure, the impact of the proposed change was evaluated and will be monitored using the three tiered approach described in Regulatory Position 3.1 of RG 1.177, and by the Maintenance Rule control discussed in Regulatory Position 3.2 of RG 1.177.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

4.1.1 Title 10 Code of Federal Regulations (CFR) Part 50

10 CFR 50.62 “Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants”

The proposed change has no impact upon how the requirements of 10 CFR 50.62 are met.

10 CFR 50.63 “Loss of all alternating current power”

The proposed change has no impact upon how the requirements of 10 CFR 50.63 are met.

10 CFR 50.65 “Requirements for monitoring the effectiveness of maintenance at nuclear power plants”

The proposed change has no impact upon how the requirements of 10 CFR 50.65 are met.

10 CFR 50 Appendix R “Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979"

The proposed change has no impact upon how the requirements of 10 CFR 50 Appendix R are met.

4.1.2 Regulatory Guide 1.177, “An Approach for Plant–Specific, Risk Informed Decision Making: Technical Specifications”

RG 1.177 provides an acceptable method for licensees to use in assessing the nature and impact of Technical Specification changes when the licensee chooses to support the changes with risk information. FPLE-PB has performed a probabilistic risk assessment using the guidance of RG 1.177 to support the proposed TS change which allows two separate one-time extensions of the CT for TS 3.7.5.C from seven days to 16 days. The applicable guidance in RG 1.177 is provided as an acceptable incremental conditional core damage probability (ICCDP) and incremental conditional large early release probability (ICLERP). The ICCDP and ICLERP resulting from the proposed extensions were determined to be within the guidelines published in RG 1.177 when the CT for TS 3.7.5.C is extended from seven days to 16 days. Thus, the proposed TS changes meet the guidance of RG 1.177, which provides a basis for approval.

4.1.3 NUREG 0737, "Clarification of TMI Action Plan Requirements"

The PBNP TS 3.7.5 CT of 7 days to restore one inoperable MDAFW system is based on the PBNP commitment and associated NRC SE dated April 21, 1981, regarding NUREG 0737, Item II.E.1.1 Short Term Recommendation GS-1.

4.2 Precedent

None. A similar one-time amendment was approved for use at PBNP in 1994 when two additional EDGs were installed. See Reference 1.

4.3 Significant Hazards Consideration

FPLE-PB has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92(c) as discussed below:

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

Response: No

The results of the Technical Evaluation (Section 3.0) demonstrate that, with the requested change, the increase in the probability of an accident previously evaluated fall within the guidance in RG 1.177. Therefore, the risk impact of the proposed CT extensions is small.

The ability of the AFW system to deliver the required flow to mitigate design basis accidents is maintained. The ability to isolate AFW flow to or steam supply from the affected steam generator during design basis accidents is unaffected by this requested change. The applicable radiological analyses remain bounding.

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

Response: No

The requested change to extend the CT of TS 3.7.5.C from 7 days to 16 days to replace a MDAFW pump and motor will not create the possibility of a new or different kind of accident. Two unit-specific TDAFW pump systems and one MDAFW pump system will remain OPERABLE and capable of performing the AFW system function. Prior to taking the MDAFW pump out of service for pump and motor replacement, both unit-specific turbine-driven auxiliary feedwater (TDAFW) pump systems and the other MDAFW pump system will be demonstrated OPERABLE. To ensure that the redundant AFW pump systems remain OPERABLE, risk management actions will be taken that include protecting the redundant operable AFW pump systems.

To manage the fire risk due a MDAFW pump being inoperable, compensatory measures will be initiated to monitor and ensure that combustible loading, work activities, and other activities that could increase the likelihood of a fire are minimized. An initial baseline and weekly thermography of potential fire initiators will be performed to detect degrading operating equipment. No new failure will be created.

3. Do the proposed changes involve a significant reduction in a margin of safety?

Response: No

The ability of the AFW system to deliver the required flow to mitigate design basis accidents will be maintained. The ability to isolate AFW flow to or steam supply from the affected steam generator during design basis accidents is unaffected by this requested change. The applicable radiological analyses remain bounding. No significant reduction in a margin of safety will occur.

Based on the above, FPLE-PB concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c) and, accordingly, a finding of “no significant hazards consideration” is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission’s regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 EVIRONMENTAL CONSIDERATION

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

6.0 REFERENCES

1. Letter from NRC to PBNP, “Amendment Nos. 153 and 157 to Facility Operating License Nos. DPR-242 and DPR-27 – Point Beach Nuclear Plant, Units Nos. 1 and 2 (TACS M90077 and M90078),” dated September 23, 1994

ENCLOSURE 3

FPL ENERGY POINT BEACH, LLC
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

LICENSE AMENDMENT REQUEST 260

ONE-TIME EXTENSION OF COMPLETION TIME FOR TECHNICAL SPECIFICATION 3.7.5 AUXILIARY FEEDWATER SYSTEM

PROPOSED TECHNICAL SPECIFICATION CHANGE PAGE MARKUPS

1 Page Follows

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. One motor driven AFW pump system inoperable in MODE 1, 2 or 3.	C.1	Restore motor driven AFW pump system to OPERABLE status.	7 days* AND 10 days from discovery of failure to meet the LCO
D. Required Action and associated Completion Time for Condition A, B, or C not met. OR Two AFW pump systems inoperable in MODE 1, 2, or 3.	D.1	-----------NOTE------------ Each unit may be sequentially placed in MODE 3 within 12 hours when both units are in Condition D concurrently. ------------------------------- Be in MODE 3.	6 hours
	AND		
	D.2	-----------NOTE------------ Entry into MODE 4 is not required unless one motor driven AFW pump system is OPERABLE. ------------------------------- Be in MODE 4.	18 hours

(continued)

*During the modification of motor-driven auxiliary feedwater pump P-38A, P-38A may be INOPERABLE for up 16 days, prior to August 1, 2009.
During the modification of motor-driven auxiliary feedwater pump P-38B, P-38B may be INOPERABLE for up 16 days, prior to August 1, 2009.

ENCLOSURE 4

FPL ENERGY POINT BEACH, LLC
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

LICENSE AMENDMENT REQUEST 260

ONE-TIME EXTENSION OF COMPLETION TIME
FOR TECHNICAL SPECIFICATION 3.7.5
AUXILIARY FEEDWATER SYSTEM

SIMPLIFIED DIAGRAM OF THE AUXILIARY FEEDWATER SYSTEM

1 Page Follows

AFW System - Major Flow Paths