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May 3, 2010

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U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

BELL BEND NUCLEAR POWER PLANT
PARTIAL RESPONSE FOR RAI No. 84
AND REQUEST FOR EXTENSION
BNP-2010-096 Docket No. 52-039

References: 1) M. Canova (NRC) to R. Sgarro (PPL Bell Bend, LLC), Bell Bend COLA – Request for Information Final Letter No. 84 (RAI No. 84) with Revision – SBPA -3990, e-mail dated March 23, 2010

2) R. Sgarro (PPL Bell Bend, LLC) to U.S. Nuclear Regulatory Commission, BNP-2010-077, "Partial Response for RAI 84", dated March 17, 2010

The purpose of this letter is to respond to the request for additional information (RAI) identified in the referenced NRC correspondence to PPL Bell Bend, LLC (PPL). This RAI addresses the Ultimate Heat Sink as discussed in Chapter 9.2.5 of the Final Safety Analysis Report (FSAR) and submitted in Part 2 of the Bell Bend Nuclear Power Plant Combined License Application (COLA).

Reference 2 provided our responses to RAI No. 84 questions 09.02.05-1, 09.02.05-8 and 09.02.05-10.

The enclosure provides our response to the following RAI 84 questions:

- 09.02.05-2 (Bullets 1, 2, 3 and partial response to 4)
- 09.02.05-4 (Bullets 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 13, 14, 15, 16, 17 and 18)
- 09.02.05-5 (Bullet 1)
- 09.02.05-6
- 09.02.05-7
- 09.02.05-9
- 09.02.05-11
- 09.02.05-12
- 09.02.05-13
- 09.02.05-14 (Bullets 2, 3, 4, 5, 6 and 7)
- 09.02.05-15

D079
NRO

The responses include revised COLA text and the BBNPP COLA will be updated in a future revision to include these changes. The commitment to update the COLA with these changes is the only new regulatory commitment contained in this letter.

It has been determined that additional time is needed to address the RAI 84 questions related to water chemistry. Those RAI 84 questions are:

- 09.02.05-2 (Bullet 4-partial response)
- 09.02.05-3
- 09.02.05-4 (Bullet 7 and 11)
- 09.02.05-5 (Bullet 2)
- 09.02.05-14 (Bullet 1)

The responses to Questions 09.02.05-2 (Bullet 4-partial response), 09.02.05-3, 09.02.05-4 (Bullet 7) will be submitted by September 15, 2010. The responses to Questions 09.02.05-4 (Bullet 11), 09.02.05-5 (Bullet 2) and 09.02.05-14 (Bullet 1) will be submitted by September 1, 2010.

If you have any questions, please contact the undersigned at 570.802.8102.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on May 3, 2010

Respectfully,

Rocco R. Sgarro

RRS/dw

cc: (w/o Enclosures)

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Enclosure

Response to NRC Request for Additional Information No. 84

Questions 09.02.05-2 (Bulléts 1, 2, 3 and partial response to 4), 09.02.05-4 (Bullets 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 13, 14, 15, 16, 17 and 18), 09.02.05-5 (Bullet 1), 09.02.05-6, 09.02.05-7, 09.02.05-9, 09.02.05-11, 09.02.05-12, 09.02.05-13, 09.02.05-14 (Bullets 2, 3, 4, 5, 6 and 7), 09.02.05-15

Bell Bend Nuclear Power Plant

Question 09.02.05-2:

During its review of the information related to the site-specific UHS support systems in Bell Bend FSAR Table 3.2-1, "Classification Summary for Site-Specific SSCs," the staff found that additional information is needed and the Bell Bend FSAR needs to be revised accordingly to address the following items in accordance with GDC 1 requirements:

- While Bell Bend FSAR Table 3.2-1 indicates that non-safety-related piping is Seismic Category II, this designation is not clearly indicated on Bell Bend FSAR Figure 9.2-3. Also, the description in Bell Bend FSAR Section 9.2.5.3 indicates that some piping is used that does not satisfy American Society of Mechanical Engineering (ASME) specifications, but this information is not adequately described in Bell Bend FSAR Section 9.2.5, or indicated in Table 3.2-1 or on Figure 9.2-3.
- Bell Bend FSAR Table 3.2-1 indicates that the intake screens are non-safety-related, Seismic Category II. However, the descriptive information in the Bell Bend FSAR is not sufficient to demonstrate that the screens are not needed to ensure that the ESWEMS will not be adversely impacted by large debris. If the screens must be relied upon in this manner, they should be designated as safety-related, Seismic Category I. Also, Bell Bend FSAR Section 9.2.5 identifies this item as "bar screens" and the descriptive information in Bell Bend FSAR Chapter 3 refers to this as "steel gratings." Consistent terminology should be used throughout the Bell Bend FSAR to avoid confusion.
- Bell Bend FSAR Table 3.2-1 indicates that instrument and controls in the ESWEMS pumphouse are safety-related. This is not consistent with Figure 9.2-3 which indicates that the intake bay level and temperature instruments are non-safety-related. This inconsistency needs to be corrected. Also, in order to avoid confusion, all instruments for the site-specific UHS support systems should be identified on Table 3.2-1.
- Bell Bend FSAR Table 3.2-1 is incomplete in that it does not provide classification designations for the site-specific parts of the blowdown and chemical treatment systems, and the classification designations for the ESWEMS strainer motors are also missing.

Response:

Bullet 1: Figure 9.2-3 identifies the Seismic Category I boundaries for the ESWEMS system. Non safety-related ESWEMS piping routed in the vicinity of safety-related SSCs are seismically supported to prevent degradation of the SSC safety function during a seismic event. Those portions of non safety-related piping required to be categorized as Seismic Category II will not be identified until detailed piping design is complete.

The piping described in FSAR Section 9.2.5.3 as "not satisfying American Society of Mechanical Engineering (ASME) specifications" is referring to the ASME B31.1 piping identified in FSAR Table 3.2-1 for NSR (non safety-related) Miscellaneous piping. The FSAR will be revised as shown below.

COLA Impact:

Bullet 1: The BBNPP FSAR will be revised as follows:

9.2.5.3 Component Description

ESWEMS Piping

The ESWEMS piping and fittings are designed to ASME Section III, Class 3 requirements; including normal operation and anticipated transient conditions. They are constructed of materials compatible with the makeup water. There is also non-ASME Section III piping meeting the requirements of ASME B31.1 ~~piping~~.

Response:

Bullet 2: There are no ESWEMS intake screens per se. The design includes bar screens between the ESWEMS Retention Pond and ESWEMS pump suctions. The flow through the bar screens is less than 1 foot/minute. The bar screens are classified as non safety-related because the low velocity of the flow through the screens, and the normal standby operating status of the ESWEMS make obstruction of the intake by large debris a non-credible event between established surveillance inspections. A 24 month Surveillance Requirement (SR 3.7.19.11) to visually inspect the ESWEMS pump suction inlets for silt or debris was added by the response to RAI 68, Question 16-3, which was submitted in letter BNP-2010-071, dated March 17, 2010 (ML100780390).

The correct term for the ESWEMS intake screens is bar screens. The BBNPP FSAR Table 3.2-1, Sections 3.5.1.4 and 9.2.5.3 will be revised as shown below.

COLA Impact:

Bullet 2: The BBNPP FSAR will be revised as follows:

Table 3.2-1 {Classification Summary for Site-Specific SSCs}

(Page 2 of 9)

KKS System or Component Code	System or Component Description	Safety Classification (Note 1)	Quality Group Classification	Seismic Category (Note 2)	10CFR50 Appendix B Program (Note 4)	Location (Note 3)	Comments/Commercial Code
GFA ESWEMS System							
	ESWEMS Bar Screens	NS	D	II	No	UQF	

3.5.1.4 Missiles Generated by Tornadoes and Extreme Winds

The labyrinths will prevent a direct hit from the design basis missile to the openings. ~~Steel gratings~~ Bar screens at the water intake will be designed as security and missile barriers.

The ~~steel grating is~~ bar screens are partitioned into maximum 4.9 ft (1.5 m) long sections not to exceed 3,100 in^2 (2.0 m^2) in area. The ~~grating size~~ bar screen is 2 in (50.8 mm) x 0.375 in (9.525 mm) minimum spaced bars at 0.875 in (22.225 mm) clear with cross bending bars at 4 in (101.6 mm) on center.

9.2.5.3 Component Description

ESWEMS Pumphouse Bar Screens

They prevent debris from passing into the ESWEMS pumps, and subsequently into the Essential Service Water System heat exchangers, as well as the intercoolers, lube oil coolers, and water jackets of the emergency diesel generators. The influent flow past the bar screens (less than one foot per minute) is not sufficient enough to warrant an automatic screen wash system. The screens can be cleaned at regular maintenance intervals.

Response:

Bullet 3: The two non safety-related instruments on Figure 9.2-3 are correctly classified as non safety-related. BBNPP FSAR Table 3.2-1 will be revised to clarify the safety-related ESWEMS instruments and controls and add non safety-related instruments and controls as shown below.

COLA Impact:

Bullet 3: The BBNPP FSAR will be revised as follows:

Table 3.2-1 {Classification Summary for Site-Specific SSCs}

(Page 2 of 9)

KKS System or Component Code	System or Component Description	Safety Classification (Note 1)	Quality Group Classification	Seismic Category (Note 2)	10CFR50 Appendix B Program (Note 4)	Location (Note 3)	Comments/ Commercial Code
GFA ESWEMS System							
	Instrument and Controls in the ESWEMS Pumphouse for safety-related equipment control	S	C	I	Yes	UQF	ASMEIII/IEEE
	Instrument and Controls in the ESWEMS Pumphouse for non safety-related equipment control	NS	E	NSC	No	UQF	

Response:

Bullet 4: The ESWEMS strainer motors and electrical appurtenances will be added to FSAR Table 3.2-1 as shown below. The response to this Bullet regarding site-specific Blowdown and Chemical Treatment will be provided as indicated in the RAI response cover letter.

COLA Impact:

Bullet 4: The BBNPP FSAR will be revised as follows:

Table 3.2-1 {Classification Summary for Site-Specific SSCs}

KKS System or Component Code	System or Component Description	Safety Classification (Note 1)	Quality Group Classification	Seismic Category (Note 2)	10CFR50 Appendix B Program (Note 4)	Location (Note 3)	Comments/ Commercial Code
GFA ESWEMS System							
10GFA 10/20/30/40/AT001	~~Discharge Strainer~~ EWSEMS Self Cleaning Strainers, motors and associated electrical appurtenances	S	C	I	Yes	UQF	ASME III, IEEE

Question 09.02.05-4:

The UHS must be capable of dissipating residual heat during normal operation and accident conditions over the life of the plant in accordance with GDC 44 requirements. The descriptive information (including figures) related to the site-specific parts of the UHS support systems was reviewed by the staff to assess the adequacy of these systems to perform their UHS support functions. In addition to the information referred to in RAIs 9.2.5-02 (ID 3990/15468) and 9.2.5-03 (ID 3990/15469), the staff found that some of the information is incomplete, inaccurate, or inconsistent. Consequently, the applicant needs to address the following items in this regard and revise the Bell Bend FSAR as appropriate:

- Information specific to the certified design is comingled with site-specific information. For example, the description includes discussion about the design and functioning of isolation valves for the UHS support systems which is specific to the U. S. EPR certified design. In order to avoid future confusion about the licensing basis for Bell Bend, the description needs to clearly identify the information and design attributes that are site-specific versus the information and design attributes that are specific to the U. S. EPR certified design. Any deviations from the certified design need to be properly identified and addressed.
- The descriptive information does not explain the criteria that were used in establishing the appropriate pipe sizes (such as limiting flow velocities).
- The descriptive information does not provide design details such as system operating temperatures, pressures, and flow rates for all operating modes and alignments.
- The figures do not show the displays for the indications (e.g., local, remote panel, control room), and the instruments that provide input to a process computer and/or have alarm and automatic actuation functions.
- The descriptive information does not include a listing of alarms.
- The figures do not show relief valves; and specific set points for relief valves, alarms, and automatic functions such as filter backwash are not indicated. Also, the bases for these set points need to be explained in the system description.
- The design basis and site-specific parts of the blowdown system are not adequately described, figures showing important design details are not provided, and the consequences of failures on safety-related equipment are not addressed.
- The applicant did not explain the methods for determining the maximum water loss rate and total water loss from the cooling tower basins for the post-accident period from 72 hours to 30 days, including leakage, strainer flush, and blowdown assumptions, and the establishment of the most limiting meteorological conditions and the correlation with the heat load to yield the maximum evaporation rate. Also, Bell Bend FSAR Section 9.2.5 indicates that the worst-case 30 day period is depicted in Table 2.3-1, but this table does not provide information of this nature.
- The applicant did not explain the basis for the emergency makeup water flow rate determination, including limiting temperature requirements and excess margin that is available to accommodate expected degradation in system performance and uncertainties that exist in the analysis.
- The maximum normal makeup and blowdown rates are based on a wet bulb temperature of 81 °F (27 °C). This is not conservative in that high dry bulb temperatures coincident with low relative humidity (as opposed to coincident wet bulb temperature) will result in maximum evaporation rates. Also, the methodology for calculating the evaporation rate and water inventory that is required must either be the same as that approved for the U. S.

EPR standard plant or identified as a departure and justified accordingly; and therefore the calculation methodology needs to be addressed.

- The maximum normal makeup and blowdown rates are based on maintaining three cycles of concentration in the cooling tower basin. The number of cycles of concentration that are appropriate is dependent on the effects of the equilibrium basin water conditions on cooling tower performance (i.e., scale buildup and fouling) and the basis for allowing three cycles of concentration needs to be explained and justified.
- Bell Bend FSAR Figure 9.2-3 indicates that the ESWEMS auto strainer debris flush lines and the ESWEMS recirculation return lines are non-safety-related Seismic Category II. However, the description in Bell Bend FSAR Section 9.2.5 does NOT justify the conclusion that these functions are not necessary to ensure the long-term operability of the cooling towers (in which case, they would have to be designated as safety-related, Seismic Category I).
- Bell Bend FSAR Section 9.2.5.2-4 indicates that the chemical treatment system can be aligned to either the normal makeup system or to the ESWEMS. However, this is not consistent with U. S. EPR Figures 9.2.1-1 (Sheet 3) and 9.2.5-1, which only show a connection to the normal makeup water system.
- Bell Bend FSAR Section 9.2.5.3 indicates that the intake bay bar screens are designed to seismic class II standards. This is incorrect in that the proper designation is seismic category, not seismic class.
- Bell Bend FSAR Section 9.2.5.3 indicates that the intake bay bar screens have a large enough face area such that flow blockage is not a concern. The applicant needs to justify this determination, and provide the maximum differential pressure for the bar screens as well as the basis for this determination and a description of the method for monitoring the differential pressure across the screens.
- Bell Bend FSAR Section 9.2.5.3 indicates that the worst case environmental conditions for evaluating evaporation from the ESWEMS retention pond are described in Section 2.3.1.2.12. The staff found that this is incorrect in that no such section exists.
- Bell Bend FSAR Section 9.2.5.3 indicates that the ESWEMS retention pond inventory is based on two ESWS trains running, but this is not consistent with the description provided in Section 9.2.5.4.2 which indicates any or all ESWS trains may be operated. Consequently, this must be factored into the design-basis assumptions for establishing the minimum required 30 day water inventory in the ESWEMS retention pond.
- Bell Bend FSAR Section 9.2.5.5 indicates that the ESWEMS is designed and built for protection against seismic and missile hazards. This description is incomplete and not consistent with the design criteria described in Bell Bend FSAR Chapter 3.

Response:

Bullet 1: The BBNPP FSAR Chapter 9 incorporates by reference the U.S. EPR FSAR Chapter 9. The FSAR discussion of the equipment which is part of the certified design scope is intended to provide clarity for system interfaces. The BBNPP FSAR will be revised to identify that these components are in the certified design scope, where appropriate, and will be deleted from the BBNPP FSAR, where appropriate.

COLA Impact:

Bullet 1: The BBNPP FSAR will be revised as follows:

9.2.5.2.1 Normal ESWS Makeup

The tie-in point is inboard of (or downstream of) the ESWEMS isolation MOV. ~~The safety-related normal makeup water isolation MOV ensures the integrity of the ESWS cooling tower basin and the ESWEMS by closing in the event of a design basis accident (DBA).~~ The normal makeup water isolation valves and the ESWEMS isolation MOVs are in the certified design scope and are addressed herein for additional clarity.

9.2.5.2.2 Blowdown

The connection at the ESWS pump discharge is made through a safety-related MOV that closes automatically in the event of a DBA to ensure ESWS integrity. The normal blowdown isolation MOVs are in the certified design scope and are discussed herein for additional clarity.

An alternate blowdown path is provided from the same pump discharge connection through a second safety-related MOV in case the normal path is unavailable. The alternate blowdown isolation MOVs are in the certified design scope and are discussed herein for additional clarity.

9.2.5.2.3 Essential Service Water Emergency Makeup System

The ESWEMS isolation MOV is located inside the ESWS Pumphouse at the connection to the ESWS cooling tower basin. The ESWEMS isolation MOVs are in the certified design scope and are discussed herein for additional clarity.

After 72 hours have elapsed under accident conditions, the safety-related recirculation isolation MOVs operate in conjunction with the ESWEMS isolation MOVs to allow the ESWEMS pumps to operate within their optimum range by modulating the flow of water back to the ESWEMS Retention Pond, based on control inputs from the ESWS Cooling Tower basin water level control systems. The ESWS Cooling Tower basin level control system is in the certified design scope and is discussed herein for additional clarity.

9.2.5.3 Component Description

~~Normal ESW Makeup Isolation Valves~~

~~The normal ESWS Makeup Water System Isolation valves are safety-related MOVs designed to ASME Section III, Class 3 requirements.~~

~~ESWEMS Isolation Valves~~

~~The ESWEMS isolation valves are safety-related MOVs designed to ASME Section III, Class 3 requirements, and are made of materials compatible with the emergency makeup water.~~

~~**ESWS Cooling Tower Blowdown System Isolation Valves**~~

~~These are safety-related MOVs that isolate blowdown at the branch connection on the ESWS pump discharge, for assurance of ESWS integrity in the event of an accident. The valves and the branch connections up to the valves are designed to ASME Section III, Class 3 requirements and constructed of materials compatible with the makeup water.~~

9.2.5.4.1 Normal Operating Conditions

The ESWEMS for each division is in standby, with the ESWEMS isolation MOV at the ESWS cooling tower basin closed and the pump isolation MOV closed. The recirculation line's MOV is also closed.

The ESWS normal makeup MOVs, blowdown isolation MOVs, and ESWEMS isolation MOVs are in the certified design scope and are discussed herein for additional clarity.

9.2.5.4.2 Abnormal Operations

After 72 hours have elapsed under accident conditions, the safety-related recirculation isolation MOVs operate in conjunction with the ESWEMS isolation MOVs to allow the ESWEMS pumps to operate within their optimum range by modulating the flow of water back to the ESWEMS Retention Pond, based on control inputs from the ESWS Cooling Tower basin water level control systems.

The ESWS normal makeup MOVs, blowdown isolation MOVs, ESWEMS isolation MOVs and ESWS cooling tower basin level control systems are in the certified design scope and are discussed herein for additional clarity.

9.2.5.5 Safety Evaluation

However, the connections to safety-related piping through which these functions are made and the accompanying isolation valves are safety-related, which ensures the integrity of the safety-related piping in the event of a DBA. The safety-related blowdown isolation valves are in the certified design scope and are discussed herein for additional clarity.

9.2.5.6 Inspection and Testing Requirements

The ESWEMS components, including the safety-related ~~motor operated isolation valves for makeup,~~ makeup recirculation isolation valves, ~~and blowdown, and the safety-related isolation valves for chemical treatment and sampling,~~ are procured and fabricated in accordance with the quality requirements for safety-related ASME Section III, Class 3 systems, structures and components to ensure compliance with approved specifications and design documents.

Finally, periodic surveillance testing of the system, including ~~the safety-related isolation valves and~~ the safety-related recirculation isolation valves, provides continuing assurance of the system's ongoing capability to perform its design function. Surveillance testing includes system performance tests and inspection of individual components, as appropriate to their importance to system function and their tendency to degrade due to their operational conditions and environment.

Response:

Bullet 2: ESWEMS piping is sized to provide sufficient flow rates of makeup water to replenish losses from evaporation, drift, leakage, and UHS cooling tower basin seepage under DBA conditions and worst anticipated environmental conditions while maintaining flow velocity less than 10 feet per second. The FSAR will be revised as shown below.

COLA Impact:

Bullet 2: The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS Piping

<u>The ESWEMS piping is sized to provide sufficient flow rates of makeup water to replenish losses from evaporation, drift, leakage and UHS cooling tower basin seepage under DBA conditions and the worst anticipated environmental conditions while maintaining flow velocity less than 10 feet per second.</u>

The ESWEMS piping and fittings are designed to ASME Section III, Class 3 requirements, including normal operation and anticipated transient conditions.

Response:

Bullet 3: The Ultimate Heat Sink design basis described in FSAR Section 9.2.5.1 identifies normal and emergency makeup flows and blowdown flows. The normal makeup water supply is the Raw Water Supply System, which obtains water from the Susquehanna River. The minimum normal makeup water temperature is 32°F and the maximum is limited by the Susquehanna River temperature in the summer. The maximum emergency makeup water supply temperature is 95°F and the minimum temperature is 32°F. The maximum operating pressure for the ESWEMS is approximately 43 psig. The FSAR will be revised as shown below.

COLA Impact:

Bullet 3: The BBNPP FSAR will be revised as follows.

9.2.5.1 Design Basis

The water supply for the ESWEMS is contained in a safety-related retention pond that is sized using the same worst case 30 day period and accounts for seepage and pond evaporation or ice cover. The maximum emergency makeup water supply temperature is 95°F and the minimum is 32°F. The maximum operating pressure for the ESWEMS is approximately 43 psig.

Response:

Bullet 4: All instrumentation will be connected to local remote multiplexing unit (RMU) instrument inputs. The ESWEMS data is available at the local and main control room locations. The ESWEMS Self Cleaning Strainers are automatically actuated by high strainer differential pressure. The FSAR text will be revised as shown below, however the figures do not require revision. Refer to the Bullet 5 response for the ESWEMS Alarms.

COLA Impact:

Bullet 4: The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS Instrumentation and Alarms

ESWEMS instrumentation indications as shown in Figure 9.2-3 are available locally and in the main control room. A list of ESWEMS alarms is provided in Table 9.2-1.

Response:

Bullet 5: The FSAR will be revised as shown below to include ESWEMS alarms. These alarms will be provided in a new FSAR table. Alarms with set points marked as "LATER" will be determined during detailed design.

COLA Impact:

Bullet 5: The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS Instrumentation and Alarms

ESWEMS instrumentation indications as shown in Figure 9.2-3 are available locally and in the main control room. A list of ESWEMS alarms is provided in Table 9.2-1.

{Table 9.2-1 ESWEMS Alarms}

Alarm Description	Equipment and/or Process Conditions for Alarm
Pump Discharge Pressure High	Pump Discharge Pressure > LATER
Pump Discharge Pressure Low	Pump Running AND Pump Discharge Pressure < LATER
Automatic Strainer Differential Pressure High	Automatic Strainer Differential Pressure > LATER
Pump Motor, Fan Motor, Motor Operated Valve or Motor Operated Damper Overload	Control Power Available at MCC AND Overload Heaters Open at MCC
Pump or Fan Motor Failure	Start/Stop Command Sent more than LATER seconds earlier AND No Running/Stopped Feedback
Motor Operated Valve or Motor Operated Damper Travel Failure	Open/Close Command Sent more than LATER seconds earlier AND No Open/Close Valve Position Feedback
Control Power Not Available	Open or Tripped MCC Breaker
Transformer Temperature High	Transformer Temperature > LATER
Pond Temperature High	Pond Temperature > LATER
Pond Level Low	Pond Level < LATER
Pond Level Low-Low	Pond Level < LATER
Fan Tripped	Fan supposed to be running
Air Conditioning Unit Tripped	Demand for Air Conditioning Unit Operation AND No Running Feedback
Computer Room Ambient Air Temperature High	Computer Room Ambient Temperature > LATER
Computer Room Ambient Air Temperature Low	Computer Room Ambient Temperature < LATER
Pump Room Ambient Air Temperature High	Pump Room Ambient Temperature > LATER
Pump Room Ambient Air Temperature Low	Pump Room Ambient Temperature < LATER
Normal Air Filter Differential Pressure High	Normal Air Filter Differential Pressure > LATER
Emergency Air Filter Differential Pressure High	Emergency Air Filter Differential Pressure > LATER
Normal Fan Discharge Temperature High	Normal Fan Discharge Temperature > LATER
Normal Fan Discharge Temperature Low	Normal Fan Discharge Temperature < LATER
Smoke Detected	Smoke Detector Detects Smoke

Response:

Bullet 6: An over-pressure report will be prepared during detailed design that will determine the need for over-pressure protection and applicable setpoints, if needed. FSAR Table 9.2-1 from the Bullet 5 identifies ESWEMS alarm setpoints. The FSAR will be revised as shown below.

COLA Impact:

Bullet 6: The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS Self Cleaning Strainers

The strainers remove debris from the process flow that could cause sedimentation buildup in the ESWS Cooling Tower basins. The pressure relief backflush process of the strainer is initiated by either the signal of the differential pressure measuring transmitter or via manual operator initiation. The strainer setpoint will be based on limiting the differential pressure across the strainer to the value assumed in the ESWEMS pump sizing basis calculation. Effluent from the strainers is returned to the ESWEMS Retention Pond through the ESWEMS recirculation/bypass line.

Response:

Bullet 7: The response to this question will be provided as identified in the RAI response cover letter.

Response:

Bullet 8: The maximum water loss rate from the UHS cooling towers was determined based on the calculated Large Break Loss of Coolant Accident (LBLOCA) heat loads for the post-accident period from 72 hours to 30 days and the maximum worst case cooling tower evaporation for a consecutive 27 day period of meteorological data from the Wilkes-Barre/Scranton National Weather Service site from 1965 to 2001.

There is no direct correlation between the LBLOCA heat loads and the calculated evaporation rates due to actual daily heat loads and actual worst case evaporation being used (i.e., the worst case day for cooling tower evaporation is day 15 with the total cooling tower heat load at 85% of the maximum 27 day heat load).

ESWEMS strainer flushing water is returned to the retention pond and is not a loss term. Blowdown flow is secured at the beginning of a design basis accident to conserve water inventory. The UHS cooling tower basin is a concrete structure; therefore, seepage from the cooling towers is assumed to be negligible. ESWS and ESWEMS leakages are

assumed to be negligible. The UHS cooling tower drift is assumed to be 0.005% of the ESWS circulating flow as identified in BBNPP FSAR Table 2.0-1.

Table 2.3-1 should not be referenced in this section of the BBNPP FSAR and will be revised as shown below.

COLA Impact:

Bullet 8: The BBNPP FSAR will be revised as follows.

9.2.5.1 Design Basis

This quantity is based on maximum evaporative losses 72 hours post-accident, with the ambient conditions matching the historical worst case consecutive 27~~30~~-day period. The worst case 27~~30~~-day period ~~is depicted in Table 2.3-1.~~ for evaporation is based on the worst consecutive 27 day period of meteorological data from the Wilkes-Barre/Scranton National Weather Service site from 1965 to 2001.

Response:

Bullet 9: The emergency makeup water flow rate includes 200 gpm for the maximum UHS cooling tower evaporation rate and 110 gpm of strainer backwash flow.

The large break loss of coolant accident heat loads and the worst 30 day period meteorological data for evaporation were used to develop evaporation rates for the proposed UHS cooling towers as required by Regulatory Guide (RG) 1.27. Drift and seepage from the UHS cooling tower basin were found to be negligible with respect to pump sizing.

The calculated flow rates include friction factor of 0.017 and aging factor of 1.2. This results in approximately 29% margin.

COLA Impact:

Bullet 9: The BBNPP FSAR will be revised as follows.

9.2.5.3 ESWEMS Retention Pond

The ESWEMS Retention Pond is an excavation in existing soils. Embankments are provided for additional freeboard and as required to match higher topography, but are not necessary to maintain the required volume of water for emergency makeup.

The total volume of the Retention Pond includes the evaporation and drift makeup requirements of UHS cooling towers, 30 days of Retention Pond seepage loss and the greater of either 30 days of pond evaporation or the volume of water lost to ice cover. No additional volume is needed for the ESWEMS pump NPSH requirements.

Response:

Bullet 10: The maximum evaporation, ambient environmental conditions (81°F wet bulb) and calculation methodology identified in U.S. EPR FSAR Table 9.2.5-2 for the U.S. EPR UHS cooling tower design parameters are used to calculate the BBNPP maximum makeup rate. These parameters are in the certified design scope and are translated into the BBNPP FSAR for completeness and as the basis for the ESWS blowdown calculations for the plant water balance. If the U.S. EPR FSAR is changed to reflect different environmental conditions that affect the UHS cooling tower design parameters, those changes will be evaluated for potential impact to the BBNPP COLA and the COLA revised, as necessary.

COLA Impact:

Bullet 10: The BBNPP FSAR will not be revised as a result of the response to this question.

Response:

Bullet 11: The response to this question will be provided as identified in the RAI response cover letter.

Response:

Bullet 12: BBNPP FSAR Figure 9.2-3 does not indicate that the ESWEMS auto strainer debris flush lines and the ESWEMS recirculation return lines are non safety-related Seismic Category II. Figure 9.2-3 only identifies the pipes downstream of the safety-related MOVs as non safety-related, non Seismic Category I.

BBNPP FSAR Section 3.4.3.1 addresses internal flooding in the ESWEMS Pumphouse and states:

> The ESWEMS Pumphouse floors are sloped and provided with trenches to route water leakage above grade back into the pumpwell.

Therefore, failure of the recirculation line or strainer blowdown line will cause the discharged water to flow back to the pump inlet. None of the ESWEMS Retention Pond volume would be lost from this event and the safety-related flow path would be unaffected; therefore, Seismic Category II is acceptable for these lines. For portions of the lines that cannot impact the safety function of the ESWEMS, the categorization will be Non-Seismic. The FSAR will be revised as shown below.

COLA Impact:

Bullet 12: The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS Piping

The ESWEMS piping and fittings are designed to ASME Section III, Class 3 requirements, including normal operation and anticipated transient conditions. They are constructed of materials compatible with the makeup water. There is also non-ASME Section III piping meeting the requirements of ASME B31.1 ~~piping~~. Failure of the B31.1 piping will not degrade the safety function of the ESWEMS; therefore, it is classified as Seismic Category II or Non-Seismic.

Table 3.2-1 {Classification Summary for Site-Specific SSCs}

(Page 2 of 9)

KKS System or Component Code	System or Component Description	Safety Classification (Note 1)	Quality Group Classification	Seismic Category (Note 2)	10CFR50 Appendix B Program (Note 4)	Location (Note 3)	Comments/Commercial Code
GFA ESWEMS System							
	Miscellaneous piping	NS	D	II or NSC	No		ASME B31.1

Response:

Bullet 13: Chemical additions to the emergency makeup flow stream are not possible. The design of the Essential Service Water System, as shown in U.S. EPR FSAR Figure 9.2.1-1 (Sheet 3 of 4), shows the interconnection of the chemical addition line to the normal makeup flow stream to the cooling tower basins. The emergency makeup line interconnection is downstream of the chemical addition interconnection and would be isolated by the closure of isolation valve AA019 in a design basis event. The inability to add chemicals via the emergency makeup system was recognized and discussed during the PPL response to RAI 89, Question 14.02-31 in PPL letter BNP-2010-067, dated March 3, 2010 (ML100680103). BBNPP FSAR 9.2.5.4 was revised to clarify that the ESWS Makeup Water Chemical Treatment can only provide chemistry control to the ESWS cooling tower basins.

COLA Impact:

Bullet 13: The BBNPP FSAR will not be revised as a result of this question.

Response:

Bullet 14: The FSAR text should refer to Seismic Category II, not seismic class II. FSAR 9.2.5.3 text will be revised as shown below.

COLA Impact:

Bullet 14: The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS Pumphouse Bar Screens

The ESWEMS Pumphouse includes four bar screens, one in each pump bay. These screens are designed to ~~seismic class II standards~~ Seismic Category II requirements.

Response:

Bullet 15: The flow through the bar screens is less than 1 foot/minute. Based on the low flow velocity through the bar screens, the absence of siltation in the EWSEMS Retention Pond and the 24 month Surveillance Requirement to check for excess debris and siltation, there is no need to monitor the differential pressure across the bar screens. A 24 month Surveillance Requirement (SR 3.7.19.11) to visually inspect the ESWEMS pump suction inlets for silt or debris, was added by the response to RAI 68, Question 16-3, which was submitted in letter BNP-2010-071, dated March 17, 2010 (ML100780390).
The differential pressure across the bar screen would be negligible and have no effect on system operation and there are no credible scenarios that would affect system operation. The BBNPP FSAR will be revised as shown below to identify the flowrate through the bar screens.

COLA Impact:

Bullet 15: The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS Pumphouse Bar Screens

The ESWEMS Pumphouse includes four bar screens, one in each pump bay. These screens are designed to ~~seismic class II standards~~ Seismic Category II requirements. They prevent debris from passing into the ESWEMS pumps, and subsequently into the

Component Cooling Water System heat exchangers, as well as the intercoolers, lube oil coolers, and water jackets of the emergency diesel generators. The influent flow past the bar screens (less than one foot per minute) is not sufficient enough to warrant an automatic screen wash system. The screens can be cleaned at regular maintenance intervals.

Response:

Bullet 16: The BBNPP FSAR will be revised to include a description of the worst case environmental conditions for ESWEMS Retention Pond evaporation as shown below.

COLA Impact:

Bullet 16: The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS Retention Pond

The worst case environmental conditions are ~~described in section 2.3.1.2.12~~. based on 30 years of historical meteorological data for the area as required by Regulatory Guide (RG) 1.27 (NRC, 1976). The lowest day of average relative humidity is combined with the highest average monthly insolation and the 1% exceedance extreme annual wind speed to create a synthetic day for single day worst case pond evaporation. This synthetic day is then repeated for 30 consecutive days to create a conservative 30 day period.

Response:

Bullet 17: Two essential service water trains are secured after 48 hours (or earlier) in a DBA scenario. The FSAR will be revised to reflect operation of two ESWEMS trains during a DBA after 72 hours, when ESWEMS is required.

COLA Impact:

Bullet 17: The BBNPP FSAR will be revised as follows.

9.2.5.4.2 Abnormal Operation

On receipt of an accident signal, the normal ESWS Makeup Water System isolation MOVs that are open will close; those that are closed will remain closed. In addition, the ESWS cooling tower blowdown isolation valves will close~~,~~. ~~and any open safety-related in the chemical treatment system will close.~~ None of these safety-related valves can be opened until the accident signal is cleared. For the first 72 hours after a DBA, the ESWS relies on the cooling tower basin inventory to make up for system losses due to evaporation. Subsequent action is manually initiated from the main control room or locally, based on operators' judgment resulting from prevailing conditions and indications. This includes initiating the ESWEMS ~~to any and/or all~~ makeup flow to two of the four ESWS cooling tower basins~~,~~. ~~as well as blowdown from any and/or all ESWS cooling tower basins. After~~

~~72 hours have elapsed under accident conditions, the~~ The safety-related recirculation isolation MOVs operate in conjunction with the ESWEMS isolation MOVs to allow the ESWEMS pumps to operate within their optimum range by modulating the flow of water back to the ESWEMS Retention Pond, based on control inputs from the ESWS Cooling Tower basin level water level control systems.

Response:

Bullet 18: The ESWEMS pumphouse meets the requirements of GDC 2. It has been designed for protection against seismic events, tornados, externally generated missile hazards and internal flooding.

The maximum elevation of the Probable Maximum Flood (PMF) with wave run-up is below the top of the finished slab elevation, which eliminates the need of an external flood analysis. The effect of the maximum water level is localized to the pumpwell structure which has been analyzed for the effect of the water surge and the wave force.

COLA Impact:

Bullet 18: The BBNPP FSAR will be revised as follows.

9.2.5.5 Safety Evaluation

This function is assured because the ESWEMS:

- ~~Has an ESWEMS Pumphouse which is designed and built for protection against seismic and missile hazards,~~ Pumphouse meets the requirements of GDC 2. It has been designed for protection against seismic events, tornados, externally generated missile hazards and internal flooding. The maximum elevation of the Probable Maximum Flood (PMF) with wave run-up is below the top of the finished slab elevation, which eliminates the need to perform an external flood analysis. The effect of the maximum water level is localized to the pumpwell structure which has been analyzed for the effect of the water surge and the wave force.

Question 09.02.05-5:

The site-specific parts of the UHS support systems are necessary to ensure that the required heat removal capability of the ESWS (including cooling towers) is maintained in accordance with GDC 44 requirements. The staff reviewed the description in Bell Bend FSAR Section 9.2.5 to confirm that the UHS support systems are adequate in this regard. The provisions to blowdown and chemically treat the water in the UHS cooling towers must be adequate to maintain the ESWS water quality necessary for performing the heat removal function and minimizing degradation of piping and components, including those of the UHS cooling tower. Additional information is needed and the Bell Bend FSAR needs to be revised accordingly to address the following design-bases considerations that pertain to chemical treatment and the ESWEMS pumps:

- In addition to the minimum flow requirement, a description is need of other considerations that are pertinent to the design basis of the ESWEMS pumps, such as head losses that may exist through the bar screens and pump suction screens, fluctuations in the supplied electrical frequency, increased pipe roughness due to aging and fouling, fouled debris filters, and the actual amount of excess margin that is provided by the ESWS pump design.
- With respect to chemical treatment, additional information is needed to describe more specifically the water quality specifications that are necessary to ensure adequate performance of the ESWS (including adequate cooling tower performance). The maintaining of specifications during normal operating, shutdown, and post-accident conditions also needs to be described, recognizing that blowdown and chemical treatment are not assured functions.

Response:

Bullet 1: Degradation due to siltation will not occur because of the normal quiet state of the pond and the composition of the in situ clay materials. The in situ clays have very low permeability, which minimizes silt formation. The low velocity of the suction flow (less than one foot per minute) through the screens and normal standby operating status of the ESWEMS make obstruction of the intake by large debris a non-credible event during the 24 month surveillance interval. A 24 month Surveillance Requirement (SR 3.7.19.11) to visually inspect the ESWEMS pump suction inlets for silt or debris, was added by the response to RAI 68, Question 16-3, which was submitted in letter BNP-2010-071, dated March 17, 2010 (ML100780390).

The system pressure loss calculation includes 20% margin to account for aging and fouling and a 5 psi drop across the automatic strainer. The 400 gpm capacity of the ESWEMS pumps results in 29% margin over the required flow rate of 310 gpm.

The minimum allowable head of the ESWEMS pump provides 107% margin over the 48 ft required head of the system, which includes the 20% aging and fouling factor. The ESWEMS pumps do not need to consider frequency variations when they are fed by the Class 1E diesel generators. The Class 1E diesel generators will maintain the steady state frequency at 60 Hz. When the ESWEMS pumps are fed from offsite power, normal frequency variation is +/- 3 Hz (5%). Pump speed and flow are directly proportional to frequency, therefore; the pump flow will decrease by no more than 5%. The 400 gpm rating of the pump has adequate margin to maintain UHS basin water level in the design operating range with a 5% reduction in flow. For larger long term frequency variations, the operator can transfer the ESWEMS pump to the Class 1E diesel generators.

COLA Impact:

Bullet 1: The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS Pumphouse Bar Screens

The influent flow past the bar screens (less than one foot per minute) is not sufficient enough to warrant an automatic screen wash system.

ESWEMS ~~System~~ Pumps

There are four vertical turbine pumps, each rated at 400 gpm (approximately 1,515 l/min). Each pump is driven by an electric motor, and is equipped with a discharge check valve. They are designed to ASME Section III, Class 3 requirements, and constructed of materials compatible with the ESWS makeup water.

The system pressure loss calculation includes 20% margin to account for aging and fouling and a 5 psi drop across the automatic strainer. The 400 gpm capacity of the ESWEMS pumps results in 29% margin over the required flowrate of 310 gpm.

The minimum allowable head of the ESWEMS pump provides 107% margin over the 48 ft required head of the system, which includes the 20% aging and fouling factor.

Response:

Bullet 2: The response to this question will be provided as identified in the RAI response cover letter.

Question 09.02.05-6:

The ESWEMS must be capable of performing its UHS support function of providing makeup water to the UHS cooling tower basin for the period beginning at 72 hours post-accident through the remaining 30 day period in accordance with GDC 44 requirements. In order to satisfy system flow requirements, the ESWEMS design must assure that the minimum net positive suction head (NPSH) for the ESWEMS pumps will be met for all postulated conditions, including consideration of vortex formation. The staff found that the NPSH requirement for the ESWEMS pumps is not specified and Bell Bend FSAR Section 9.2.5 does not describe the compliance of the ESWEMS design with the NPSH requirement for the ESWEMS pumps and does not identify the excess margin that is provided by the ESWEMS design for the most limiting assumptions. Consequently, additional information is needed and the Bell Bend FSAR needs to be revised accordingly to specify the minimum NPSH requirement is for the ESWEMS pumps and to fully explain the compliance of the system design with minimum NPSH requirement (including consideration of vortex formation), and identify the excess margin available for the most limiting case. Sufficient information is needed to enable the staff to independently confirm that the design is adequate in this regard, including limiting assumptions that were used along with supporting justification.

Response:

Net positive suction head available is calculated at a water elevation of zero feet above the eye of the pump. If a vertical pump is used, then there will be no additional head requirements from a suction pipe due to the eye of the pump being submerged. Based on this analysis, no additional pond volume is needed to account for NPSH if a submerged vertical pump with a required NPSH less than 32 feet is used. In addition, the inlet to the pump is submerged approximately 7 feet below the bottom of the pond. The intake design and height of the pump inlet from the bottom of the intake are based on the recommendations of ANSI/HI 9.8-1998 to minimize the likelihood of vortex formation.

The ESWEMS pumps will be 400 gpm minimum, vertical pumps with a minimum developed head of 100 feet.

The system pressure loss calculation includes 20% margin to account for aging and fouling and a 5 psi drop across the automatic strainer. The 400 gpm capacity of the ESWEMS pumps results in 29% margin over the required flow rate of 310 gpm.

The minimum allowable head of the ESWEMS pump provides 107% margin over the 48 ft required head of the system, which includes the 20% aging and fouling factor.

COLA Impact:

The BBNPP FSAR will be revised as follows.

9.2.5.2.3 Essential Service Water Emergency Makeup System

The ESWEMS Pumphouse is shown in Figure 9.2-4 (Floor Plan) with the section views provided in Figure 9.2-5, Figure 9.2-6, Figure 9.2-7 and plan views of the pump well (Figure 9.2-8), the Mezzanine (Figure 9.2-9) and the roof (Figure 9.2-10). <u>The intake design and</u>

height of the pump inlet from the bottom of the intake are based on the recommendations of ANSI/HI 9.8-1998 (ANSI/HI, 1998) to minimize the likelihood of vortex formation.

9.2.5.3 Component Description

ESWEMS ~~System~~ Pumps

There are four vertical turbine pumps, each rated at 400 gpm (approximately 1,515 l/min) minimum, with a minimum developed head of 100 feet. Each pump is driven by an electric motor, and is equipped with a discharge check valve. They are designed to ASME Section III, Class 3 requirements, and constructed of materials compatible with the ESWS makeup water.

The system pressure loss calculation includes 20% margin to account for aging and fouling and a 5 psi drop across the automatic strainer. The 400 gpm capacity of the ESWEMS pumps results in 29% margin over the required flow rate of 310 gpm.

The minimum allowable head of the ESWEMS pump provides 107% margin over the 48 ft required head of the system, which includes the 20% aging and fouling factor.

9.2.5.8 References

~~No departures or supplements.~~}

ANSI/HI, 1998. ANSI/HI 9.8, Centrifugal/Vertical Pump Intake Design, American National Standards Institute/Hydraulics Institute, 1998.

Question 09.02.05-7:

The site-specific parts of the UHS support systems are necessary to ensure that the required heat removal capability of the ESWS (including cooling towers) is maintained in accordance with GDC 44 requirements. The staff reviewed the description in Bell Bend FSAR Section 9.2.5 to confirm that the UHS support systems are adequate in this regard. Bell Bend FSAR Table 2.0-1 shows that the 1% exceedance minimum ambient air temperature for the site is -15.1 °F (-26.2 °C), and that the 0% exceedance value is -23.7 °F (-30.9 °C). Therefore, low temperature operation and potential freezing is a consideration for the UHS support systems. U. S. EPR FSAR Section 9.2.5 indicates that cooling tower bypass flow is used to keep the water in the cooling tower basin within established limits and protect the ESWS from freezing. This will also protect ESWS blowdown flow from freezing, provided that ESWS blowdown is not secured during low temperature conditions. However, cooling tower bypass flow will not protect ESWEMS or the chemical treatment system from freezing. Bell Bend FSAR Section 9.2.5 does not address low temperature operation of the UHS support systems. Consequently, additional information is needed and the Bell Bend FSAR needs to be revised accordingly to describe provisions that will be implemented to ensure that the UHS support systems will remain capable of performing their functions during low temperature conditions.

Response:

BBNPP FSAR Table 2.0-1 was revised in the response to RAI 77, Question 09.04.05-4, in PPL letter BNP-2010-003, dated January 14, 2010 (ML100191534). This revision changed the 0% and 1% exceedances values to -15.1°F (-26.2°C) and 27.9°F (-2.3°C), respectively. However, low temperature operation and potential freezing remain as considerations for UHS support system operation. Therefore, heat tracing/freeze protection will be used as necessary for the ESWEMS, chemical treatment and other piping necessary to support UHS and ESWS operation. The specific application of heat tracing to systems will be considered during the detailed design phase of the project. The response to RAI 9, Question 14.02-1, provided in PPL letter BNP-2009-092, dated June 18, 2009 (ML091700686), included heat tracing/freeze protection in FSAR 8.3.1.4. Heat tracing/freeze protection will be added as necessary, to other UHS support systems as shown below.

COLA Impact:

The BBNPP FSAR will be revised as follows.

9.2.5.2.1 Normal ESWS Makeup

The tie-in point is inboard of (or downstream of) the ESWEMS isolation MOV. ~~The safety-related normal makeup water isolation MOV ensures the integrity of the ESWS cooling tower basin and the ESWEMS by closing in the event of a design basis accident (DBA).~~ The normal makeup water isolation valve and the ESWEMS isolation MOV are in the certified design scope and are addressed herein for additional clarity.

Heat tracing will be used as necessary for freeze protection of normal ESWS makeup piping to ensure its availability during low temperature conditions.

9.2.5.2.2 Blowdown

An alternate blowdown path is provided from the same pump discharge connection through a second safety-related MOV in case the normal path is unavailable. The alternate blowdown isolation MOVs are in the certified design scope and are discussed herein for additional clarity.

Heat tracing will be used as necessary for freeze protection of site-specific blowdown piping to ensure its availability during low temperature conditions.

9.2.5.2.3 Essential Service Water Emergency Makeup System

Instrumentation and controls are provided for monitoring and controlling individual components and system functions.

Heat tracing will be used as necessary for freeze protection of ESWEMS piping to ensure its availability during low temperature conditions.

9.2.5.2.4 ESWS Makeup Water Chemical Treatment

Specific chemicals and concentrations are discussed in detail in BBNPP ER Section 3.3 and 3.6.

Heat tracing will be used as necessary for freeze protection of the Chemical Treatment System to ensure its availability during low temperature conditions.

Question 09.02.05-9:

The ESWEMS must be capable of performing its UHS support function of providing makeup water to the UHS cooling tower basin for the period beginning at 72 hours post-accident through the remaining 30 day period in accordance with GDC 44 requirements. Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment," was issued to address the observed degradation over time of service water systems. The GL called for implementation of programmatic controls, surveillance, and routine inspection and maintenance to assure that the performance capability and integrity of service water systems are adequately maintained over time. Because the ESWEMS is an extension of the ESWS for Bell Bend, the provisions of GL 89-13 apply. However, the staff noted that Bell Bend FSAR Section 9.2.5 does not explain the application of the provisions of GL 89-13 to the ESWEMS. Consequently, additional information is needed and the Bell Bend FSAR needs to be revised accordingly to provide the provisions specified by GL 89-13 for implementing the operability and reliability of the ESWEMS over the life of the plant.

Response:

As part of the Ultimate Heat Sink, the ESWEMS inspection and maintenance program complies with Generic Letter 89-13, Actions I and III for open-cycle cooling water systems. The FSAR will be revised as shown below.

COLA Impact:

The BBNPP FSAR will be revised as follows.

9.2.5.6 Inspection and Testing Requirements

Surveillance testing includes system performance tests and inspection of individual components, as appropriate to their importance to system function and their tendency to degrade due to their operational conditions and environment.

The ESWEMS inspection and maintenance program complies with Generic Letter 89-13 (NRC, 1989) Actions I and III for open-cycle cooling water systems.

9.2.5.8 References

~~No departures or supplements.~~}

NRC, 1989. Service Water System Problems Affecting Safety-Related Equipment, Generic Letter 89-13, U.S. Nuclear Regulatory Commission, July 18, 1989.

Question 09.02.05-11:

The ESWEMS must be capable of performing its UHS support function of providing makeup water to the UHS cooling tower basin for the period beginning at 72 hours post-accident through the remaining 30 day period in accordance with GDC 44 requirements. Over time, debris such as spalled concrete, tools, miscellaneous hardware and objects, and large amounts of silt have accumulated in intake bays at some operating nuclear power plants. These items can be drawn into the suctions of the ESWEMS pumps (which take water from the intake bay) and pose a hazard for pump operation. Typically, screens are provided to protect the pump suctions from this sort of hazard. The staff noted that there is no discussion in FSAR Section 9.2.5 to address this vulnerability. Consequently, additional information is needed and the Bell Bend FSAR needs to be revised accordingly to describe the protection of the ESWEMS pumps from the intrusion of debris that can accumulate in the intake bay and the prevention of the excessive accumulation of silt such that pump performance will not be degraded over extended periods of time.

Response:

The description of the ESWEMS pumps will be revised to include screens used to protect the pump suctions from debris. The FSAR will be revised as shown below.

Degradation due to siltation will not occur because of the normal quiet state of the pond and the composition of the in situ clay materials. The in situ clays have very low permeability, which minimizes silt formation. The low velocity of the suction flow (less than one foot per minute) through the screens and normal standby operating status of the ESWEMS make obstruction of the intake by large debris a non-credible event during the 24 month surveillance interval. A 24 month Surveillance Requirement (SR 3.7.19.11) to visually inspect the ESWEMS pump suction inlets for silt or debris, was added by the response to RAI 68, Question 16-3, which was submitted in letter BNP-2010-071, dated March 17, 2010 (ML100780390).

COLA Impact:
The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS ~~System~~ Pumps

There are four vertical turbine pumps, each rated at 400 gpm (approximately 1,515 l/min). Each pump is driven by an electric motor, and is equipped with <u>intake screens to protect the pump suctions from debris and</u> a discharge check valve.

Question 09.02.05-12:

The ESWEMS is a safety-related system and in accordance with GDC 45 requirements, it must be designed so that periodic inspections of piping and components can be performed to assure that the integrity and capability of the system will be maintained over the life of the plant. The staff finds the design to be acceptable if the FSAR describes inspection program provisions that will be implemented and are considered adequate for this purpose. While Bell Bend FSAR Section 9.2.5.6 indicates that periodic inspections will be performed, the staff considers the information that was provided to be incomplete and inadequate. In particular, it does not (1) specify programmatic requirements and procedural controls that will be implemented for performing inspections; (2) describe the extent and nature of inspections that will be conducted; (3) address the major ESWEMS components and structures, such as pumps, valves, strainers, intake bay and bar screens, retention pond, and associated piping (including buried piping); (4) consider and address industry experience; and (5) address the specific provisions of GL 89-13. Consequently, additional information is needed and the Bell Bend FSAR needs to be revised accordingly to address these considerations such that the continued operability and reliability of ESWEMS is assured over the life of the plant commensurate GDC 45 requirements.

Response:

The ESWEMS is initially tested with the program given in FSAR Section 14.2.14.1. The design and installation of the ESWEMS provides accessibility for the performance of periodic inservice inspection and testing. Periodic inspection and testing of safety-related equipment (including pumps, valves, strainers, intake bay and bar screens, and associated piping) verifies its structural and leak tight integrity and its availability and ability to fulfill its functions. Inservice inspection and testing requirements are in accordance with Section XI of the ASME Boiler and Pressure Vessel (BPV) Code and the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM) Code.

BBNPP FSAR Section 3.9.6 commits to following the inservice testing and inspection requirements described in Section 3.9.6 of U.S. EPR FSAR Tier 2 for ESWEMS Systems, Structures and Components (SSCs). BBNPP FSAR Section 6.6 commits to following the pre-service and inservice testing and inspection requirements described in Section 6.6 of U.S. EPR FSAR Tier 2 for Class 3 ESWEMS SSCs. Refer to BBNPP Technical Specifications, Surveillance Requirement (SR) 3.7.19.5 through 3.7.19.11 for surveillance requirements that verify continued operability of the ESWEMS. These SRs were in existence or added by the response to RAI 68, Question 16-3, which was submitted in letter BNP-2010-071, dated March 17, 2010 (ML100780390).

The ESWEMS inspection and maintenance program will comply with Generic Letter 89-13 Actions I and III for open-cycle cooling water systems.

A review of industry experience with ESW makeup water system design will be conducted during detailed design. Design issues identified will be considered and incorporated into the BBNPP design as appropriate.

The BBNPP FSAR will be revised as shown below.

COLA Impact:

The BBNPP FSAR will be revised as follows.

9.2.5.6 Inspection and Testing Requirements

Surveillance testing includes system performance tests and inspection of individual components, as appropriate to their importance to system function and their tendency to degrade due to their operational conditions and environment.

The ESWEMS inspection and maintenance program complies with Generic Letter 89-13 (NRC, 1989) Actions I and III for open-cycle cooling water systems.

The design and installation of the ESWEMS provides accessibility for the performance of periodic inservice inspection and testing. Periodic inspection and testing of safety-related equipment (including pumps, valves, strainers, intake bay and bar screens, and associated piping) verifies its structural and leak tight integrity and its ability to fulfill its functions. Inservice inspection and testing requirements are in accordance with Section XI of the ASME Boiler and Pressure Vessel (BPV) Code (ASME, 2004a) and the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM) Code (ASME, 2004b).

A review of industry experience with ESW makeup water system design will be conducted during detailed design. Design issues identified will be considered and incorporated into the BBNPP design, as appropriate.

9.5.2.8 References

~~No departures or supplements.~~}

ASME 2004a. Rules for Inservice Inspection of Nuclear Power Plant Components, ASME Boiler and Pressure Vessel Code, BPV Code Section XI, The American Society of Mechanical Engineers, 2004 edition.

ASME 2004b. Code for Operation and Maintenance of Nuclear Power Plants, ASME OM Code, The American Society of Mechanical Engineers, 2004 edition.

NRC, 1989. Service Water System Problems Affecting Safety-Related Equipment, Generic Letter 89-13, U.S. Nuclear Regulatory Commission, July 18, 1989.

Question 09.02.05-13:

The ESWEMS is a safety-related system and in accordance with GDC 46 requirements, it must be designed so that periodic pressure and functional testing of components can be performed to assure the structural and leak tight integrity of system components, the operability and performance of active components, and the operability of the system as a whole and performance of the full operational sequences that are necessary for accomplishing the ESWEMS safety function in accordance with GDC 46 requirements The staff finds the design to be acceptable if the FSAR describes pressure and functional test program requirements that will be implemented and are considered adequate for this purpose. While Bell Bend FSAR Section 9.2.5.6 indicates that periodic testing will be performed, the staff considers the information that was provided to be incomplete and inadequate. In particular, it does not (1) specify programmatic requirements and procedural controls that will be implemented for performing inspections; (2) describe the extent and nature of inspections that will be conducted; (3) address the major ESWEMS components and structures, such as pumps, valves, strainers, intake bay and bar screens, retention pond, and associated piping (including buried piping); (4) consider and address industry experience; and (5) address the specific provisions of GL 89-13. Consequently, additional information is needed and the Bell Bend FSAR needs to be revised accordingly to address these considerations such that the continued operability and reliability of ESWEMS is assured over the life of the plant commensurate GDC 46 requirements.

Response:

The ESWEMS is initially tested with the program given in FSAR Section 14.2.14.1. The design and installation of the ESWEMS provides accessibility for the performance of periodic inservice inspection and testing. Periodic inspection and testing of safety-related equipment (including pumps, valves, strainers, intake bay and bar screens, and associated piping) verifies its structural and leak tight integrity and its availability and ability to fulfill its functions. Inservice inspection and testing requirements are in accordance with Section XI of the ASME Boiler and Pressure Vessel (BPV) Code and the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM) Code.

BBNPP FSAR Section 3.9.6 commits to following the inservice testing and inspection requirements described in Section 3.9.6 of U.S. EPR FSAR Tier 2 for ESWEMS Systems, Structures and Components (SSCs). BBNPP FSAR Section 6.6 commits to following the pre-service and inservice testing and inspection requirements described in Section 6.6 of U.S. EPR FSAR Tier 2 for Class 3 ESWEMS SSCs. Refer to BBNPP Technical Specifications, Surveillance Requirement (SR) 3.7.19.5 through 3.7.19.11 for surveillance requirements that verify continued operability of the ESWEMS. These SRs were in existence or added by the response to RAI 68, Question 16-3, which was submitted in letter BNP-2010-071, dated March 17, 2010 (ML100780390).

The ESWEMS inspection and maintenance program will comply with Generic Letter 89-13 Actions I and III for open-cycle cooling water systems.

A review of industry experience with ESW makeup water system design will be conducted during detailed design. Design issues identified will be considered and incorporated into the BBNPP design as appropriate.

The BBNPP FSAR will be revised as shown below.

COLA Impact:

The BBNPP FSAR will be revised as shown below.

9.2.5.6 Inspection and Testing Requirements

Surveillance testing includes system performance tests and inspection of individual components, as appropriate to their importance to system function and their tendency to degrade due to their operational conditions and environment.

The ESWEMS inspection and maintenance program complies with Generic Letter 89-13 (NRC, 1989) Actions I and III for open-cycle cooling water systems.

The design and installation of the ESWEMS provides accessibility for the performance of periodic inservice inspection and testing. Periodic inspection and testing of safety-related equipment (including pumps, valves, strainers, intake bay and bar screens, and associated piping) verifies its structural and leak tight integrity and its ability to fulfill its functions. Inservice inspection and testing requirements are in accordance with Section XI of the ASME Boiler and Pressure Vessel (BPV) Code (ASME, 2004a) and the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM) Code (ASME, 2004b).

A review of industry experience with ESW makeup water system design will be conducted during detailed design. Design issues identified will be considered and incorporated into the BBNPP design as appropriate.

9.5.2.8 References

~~No departures or supplements.~~}

ASME 2004a. Rules for Inservice Inspection of Nuclear Power Plant Components, ASME Boiler and Pressure Vessel Code, BPV Code Section XI, The American Society of Mechanical Engineers, 2004 edition.

ASME 2004b. Code for Operation and Maintenance of Nuclear Power Plants, ASME OM Code, The American Society of Mechanical Engineers, 2004 edition.

NRC, 1989. Service Water System Problems Affecting Safety-Related Equipment, Generic Letter 89-13, U.S. Nuclear Regulatory Commission, July 18, 1989.

Question 09.02.05-14:

The staff reviewed the site-specific TS requirements that are proposed for ESWEMS in Part 4 of the COL application to confirm that they adequately reflect the information provided in Bell Bend FSAR Section 9.2.5 and to confirm that the TS Basis accurately represents the TS requirements that are proposed. The staff found that the proposed TS requirements appear to be incomplete and not entirely consistent with Standard Technical Specification requirements. Consequently, additional information is needed and the Bell Bend FSAR and TS requirements need to be revised accordingly to address the following items:

- If long-term cooling capability of the ESWS (heat exchangers and cooling towers) relies upon certain water quality specifications, TS requirements need to be established to specify appropriate actions and surveillance requirements to ensure that the heat removal function can be performed over the 30 day post-accident period as assumed. This is related to **RAI 9.2.5-05 (ID 3990/15471).**
- While the pond level requirement that is proposed is consistent with the description in Bell Bend FSAR Section 9.2.5, the basis for this level has not been adequately described in FSAR Section 9.2.5. This is related to **RAI 9.2.5-04 (ID 3990/15470)**.
- The basis for the existing surveillance requirement that specifies a minimum makeup water flow rate of 300 gpm needs to be described in Bell Bend FSAR Section 9.2.5. This is related to **RAI 9.2.5-04 (ID 3990/15470)**.
- Because the ESWEMS is normally in standby mode, the frequency of surveillance flow testing should be commensurate with systems that are normally in standby mode; once every 24 months is not appropriate. Also, in addition to periodically verifying valve positions, surveillance requirements are needed to periodically verify that the system has not drained, and to confirm that instrumentation and set points for actuation of automatic functions and annunciation are within calibration.
- A surveillance requirement is needed to periodically inspect and clean the intake bay bar screens, and to inspect for silt buildup.
- The description of the ESWEMS that is provided in the background section to replace the first set of bracketed information is incomplete in that it does not include the recirculation valve, instruments and controls, and associated piping.
- The description of the ESWEMS that is provided in the LCO section to replace the bracketed text needs to be revised to include the strainer.

Response:

Bullet 1: The response to this question will be provided as identified in the RAI response cover letter.

Response:

Bullet 2: The total volume of the ESWEMS Retention Pond includes the evaporation and drift makeup requirements of UHS cooling towers, 30 days of Retention Pond seepage and the greater of either 30 days of pond evaporation or the volume of water lost to ice cover.

Based on the worst case environmental conditions described in FSAR 9.2.5, the 30 day losses due to evaporation from the UHS cooling towers are approximately 1.1E+07 gal and losses from drift are approximately 7.4E+03 gal. No volume was assumed for the ESWEMS pump NPSH requirements. The volume lost to Retention Pond seepage is approximately 7.9E+05 gal. The volume lost to ice formation exceeds the calculated pond evaporation volume and is approximately 3.1E+06 gal. The total minimum required ESWEMS Retention Pond volume is approximately 1.5E+07 gal.

COLA Impact:

Bullet 2: The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS Retention Pond

The ESWEMS Retention Pond is an excavation in existing soils. Embankments are provided for additional freeboard and as required to match higher topography, but are not necessary to maintain the required volume of water for emergency makeup.

The total volume of the Retention Pond includes the evaporation and drift makeup requirements of the UHS cooling towers, 30 days of Retention Pond seepage loss and the greater of either 30 days of pond evaporation or the volume of water lost to ice cover. No additional volume is needed for the ESWEMS pump NPSH requirements.

Response:

Bullet 3: The ESWEMS flow rate Surveillance Requirement (SR) identified in Revision 0 of the BBNPP COLA was relocated to the U.S. EPR Generic Technical Specifications as SR 3.7.19.5 in U.S. EPR FSAR Revision 1 (ML091671705 and ML091671718) and is no longer in the BBNPP Plant Technical Specifications. The 300 gpm flow rate to the UHS cooling tower basin Surveillance Requirement identified in SR 3.7.19.5 is based on the assumed system losses based on the parameters identified in U.S. EPR FSAR 9.2.5. This Section identifies the design parameters for the UHS which are based on U.S. EPR meteorological condition assumptions. A site-specific UHS analysis was conducted for BBNPP, using maximum evaporative losses between 72 hours and 30 days post-accident, with the ambient meteorological conditions matching the historical worst case 30-day period as described in BBNPP FSAR 9.2.5.1. The results of the site-specific analysis identify that only 200 gpm supply is required to the UHS cooling tower basins in order to maintain appropriate basin level, which in turn provides the necessary NPSH for the ESWS pumps. An additional system flow rate consideration is for the ESWEMS self cleaning strainers, which are equipped with an intermittent automatic blowdown function. This intermittent blowdown is calculated to be 110 gpm and this flow rate is added to the evaporative loss makeup flow rate. The minimum 310 gpm makeup water flow is based on 200 gpm for UHS cooling tower evaporation and a simultaneous 110 gpm backwash flow through the automatic strainer.

The BBNPP COLA will be revised to identify that an exemption will be taken to the U.S. EPR Generic Technical Specification SR 3.7.19.5 and a new BBNPP Plant Technical Specification Surveillance Requirement will be added to incorporate the revised ESWEMS flow needed to the UHS cooling tower basins.

COLA Impact:
Bullet 3: The BBNPP FSAR will be revised as follows.

9.2.5.1 Design Basis

The ESWEMS, schematically represented in Figure 9.2-3, provides up to 400 gpm (1,515 l/min) of water to each operating ESWS cooling tower basin to replenish ESWS inventory losses due to evaporation, drift, and incidental system leakage starting 72 hours after an accident. The losses due to evaporation are 200 gpm and strainer backwash flows are 110 gpm. The evaporative loss requires a makeup flow rate of 200 gpm to the UHS cooling tower basins vice the 300 gpm identified in the U.S. EPR Generic Technical Specifications. The BBNPP COLA Part 4, Plant Specific Technical Specifications, and COLA Part 7, Departures and Exemption Requests, reflect this different flow rate. Drift, UHS cooling tower basin seepage and leakage flow rates are negligible with respect to pump capacity. This quantity is based on maximum evaporative losses 72 hours post-accident, with the ambient conditions matching the historical worst case consecutive 27~~30~~-day period.

The BBNPP COLA Part 4, Technical Specifications and Bases, will be revised as follows:

LCO 3.7.19 ULTIMATE HEAT SINK (UHS)

Generic Technical Specifications:
T.S. 3.7.19, "Ultimate Heat Sink (UHS)", contains no LCOs ~~or SRs~~ or bracketed requirements and one SR for the Emergency Makeup Water source. ~~However~~Additionally, the TS Bases 3.7.19, "Ultimate Heat Sink (UHS)", contains a bracketed requirement in the background section:

And a related bracketed requirement in the LCO section:

[COL applicant to provide definition of OPERABLE makeup source.]

The following Generic Technical Specification Surveillance Requirement is replaced by Plant Specific Technical Specifications Surveillance Requirement SR 3.7.19.5:

SR 3.7.19.5	Verify the ability to supply makeup water to each UHS basin at ≥ 300 gpm.	24 months

Plant Specific Technical Specifications:

Bell Bend Nuclear Power Plant has modified one generic technical specification surveillance requirement, added a required Action and added ~~six~~ seven Surveillance Requirements for the ESW Emergency Makeup System (ESWEMS) and Retention Pond.

The previous Condition C has been renumbered to Condition D. In addition, ~~six~~ eight new Surveillance Requirements have been added:

SURVEILLANCE		FREQUENCY
SR 3.7.19.5	Verify the ability to supply makeup water to each UHS basin at ≥ 200 gpm.	24 months (per the IST Program)
SR 3.7.19.12	Verify the ability to recirculate makeup water to the ESWEMS Retention Pond at ≥ 200 gpm.	92 days (per IST Program)

Justification:

The additional Condition, Required Action, and Surveillance Requirements regarding the ESWEMS valve position, automatic valve operation, strainer operation and ESWEMS pump suction flow path, makeup water flow testing and Retention Pond water level and average water temperature are necessary to ensure that the ESWEMS and Retention Pond remain OPERABLE. The modified Generic Technical Specification Surveillance Requirement verifies BBNPP site-specific design requirements.

BASES 3.7.19 ULTIMATE HEAT SINK (UHS)

Generic Technical Specifications:

The BACKGROUND section includes the following information regarding the makeup source:

The train associated safety related make-up source delivers water to each basin at ≥ 300 gpm to maintain the NPSH for the ESW pump for up to 30 days following a LOCA.

TS-Bases 3.7.19, "Ultimate Heat Sink (UHS)," also contains a bracketed requirement in the Background section:

Plant Specific Technical Specifications:

TS-Bases 3.7.19, "Ultimate Heat Sink (UHS)," is revised, in the Background section, to revise the makeup water source flow rate, remove the bracketed requirement and provide plant specific information. The following text is ~~inserted~~ revised:

The train associated safety-related makeup source delivers water to each basin at ≥ 200 gpm to maintain the NPSH for the ESW pump for up to 30 days following a

LOCA.

The following text is inserted:

A discussion of the one modified Generic Technical Specification Surveillance Requirement and ~~six~~ seven new surveillances ~~is~~ are added at the end of the Surveillance Requirements section. The modified Surveillance Requirement provided below replaces the Surveillance Requirement basis in the Generic Technical Specifications and ~~The~~ the new Surveillance Requirements are provided below:

SR 3.7.19.5

This SR verifies that adequate long term (30 day) cooling can be maintained based on BBNPP site-specific meteorological conditions. The specified makeup flowrate ensures that sufficient NPSH can be maintained to operate the ESW pumps following the first 3 days post LOCA. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint. This SR verifies that the UHS makeup flowrate to the UHS cooling tower basins is ≥200 gpm.

SR 3.7.19.12

This SR verifies that adequate long term (30 day) cooling can be maintained based on BBNPP site-specific meteorological conditions. The specified makeup flowrate ensures that sufficient NPSH can be maintained to operate the ESW pumps following the first 3 days post LOCA. The 92 day Frequency is based on the Inservice Test Program requirements, which are derived from ASME recommendations. Operating experience has shown that these components usually pass the Surveillance when performed at the 92 day Frequency. Therefore, the Frequency is acceptable from a reliability standpoint. This SR verifies that the UHS makeup pumps have a capacity flowrate of ≥200 gpm.

The BBNPP COLA, Part 7, Departures and Exemption Requests, will be revised as follows:

1.2 EXEMPTION REQUESTS

8. Generic Technical Specifications and Bases-Ultimate Heat Sink (UHS)

1.2.8 GENERIC TECHNICAL SPECIFICATIONS AND BASES-ULTIMATE HEAT SINK (UHS)

1.2.8.1 Applicable Regulation: 10 CFR Part 52

The U.S. EPR FSAR Tier 2 Generic Technical Specifications LCO 3.7.19 requires verification of the ability to supply makeup water to each UHS basin

at ≥ 300 gpm every 24 months. The BBNPP site-specific design for the UHS makeup water pump requires ≥ 200 gpm to the UHS basin based on site-specific historical meteorological conditions after 72 hours post DBA.

Pursuant to 10 CFR 50.12 and 10 CFR 52.7, PPL Bell Bend, LLC requests an exemption from compliance with the U.S. EPR FSAR Generic Technical Specification requirements associated with the UHS Makeup Flow.

1.2.8.2 Discussion:

The Generic Technical Specifications for the U.S. EPR Ultimate Heat Sink are in Chapter 16 of the U.S. EPR FSAR. Surveillance Requirement 3.7.19.5 requires verification of the ability to supply makeup water to each UHS basin at ≥ 300 gpm every 24 months. The basis for the specified makeup flowrate ensures that sufficient NPSH can be maintained to operate the ESWS pumps following the first 3 days post LOCA for the assumed worst case meteorological conditions from the U.S. EPR Site Design Envelope.

A site-specific calculation was performed to determine the minimum makeup flow rate to the UHS cooling towers based on the requirements of Regulatory Guide 1.27 after 72 hours post LOCA. The large break loss of coolant accident heat loads and the site-specific worst case consecutive 27 day period of meteorological data for evaporation were used to develop evaporation rates for the proposed UHS cooling towers as required by Regulatory Guide 1.27. This site-specific analysis determined that only 200 gpm are necessary to compensate for evaporative losses when using the 27 day worst case meteorology.
The BBNPP site-specific 400 gpm UHS makeup water pump capacity rate includes 200 gpm for the maximum UHS cooling tower evaporation rate and 110 gpm for intermittent strainer backwash flow. UHS cooling tower drift and cooling tower basin seepage were found to be negligible with respect to pump sizing. The calculated flow rate includes a friction factor of 0.017 and an aging factor of 1.2. This results in approximately 29% margin. Therefore, this change will not result in a significant decrease in the level of safety otherwise provided by the design described in the U.S. EPR FSAR.

The exemption is not inconsistent with the Atomic Energy Act or any other statute. As such, the requested exemption is authorized by law.

The change does not relate to security and does not otherwise pertain to the common defense and security. Therefore, the requested exemption will not endanger the common defense and security.

This requested exemption does not require a change in the design described in the U.S. EPR FSAR. The special circumstance necessitating the request for exemption is that it has been demonstrated via site-specific analysis that the 200 gpm makeup flow to the UHS cooling tower basin is sufficient to make up for evaporative losses for the site-specific conditions. Therefore, application of the rule is not necessary to achieve the underlying purpose of the rule.

Consistent with 10 CFR 50.12(a), a special circumstance is present that requires an exemption in that the BBNPP site-specific UHS Makeup Pump is not required to meet the U.S. EPR Generic Technical Specification stipulated 300 gpm makeup flow to maintain UHS cooling tower basin level, which in turn, maintains NPSH for the ESW pumps. Additionally, calculations confirm that the site-specific pump flow rate does not affect the safety-related function of the safety-related SSCs of the U.S. EPR. As such, application of the regulation for this particular circumstance would not serve the underlying purpose of the rule and is not required to achieve the underlying purpose of the rule.

For these reasons, PPL Bell Bend, LLC requests approval of the requested exemption from compliance with the U.S. EPR FSAR Generic Technical Specifications requirement associated with UHS Makeup Flow.

Response:

Bullet 4: The ESWEMS flow rate Surveillance Requirement (SR) identified in Revision 0 of the BBNPP COLA was relocated to the U.S. EPR Generic Technical Specifications as SR 3.7.19.5 in COLA Revision 1 and is no longer in the BBNPP Plant Technical Specifications. However, in response to RAI 84, Question 09.02.05-14 (Bullet 3), this Surveillance Requirement is being modified and included into the Plant Technical Specifications in COLA Part 4 as Surveillance Requirement 3.7.19.5 and an exemption is being requested to modify this Generic Technical Specification Surveillance Requirement. The 24 month Frequency for verification of the minimum forward flow to the cooling tower basins is appropriate as it is consistent with the ESWEMS pump testing requirements identified in the In-Service Test Program (IST) and a periodic refueling interval. Additionally, the capability of the ESWEMS pump to provide the required flow will be tested on a quarterly (every 92 days) basis per the IST Program to demonstrate that the ESWEMS pump maintains the ability to pump at least 200 gpm through the pump recirculation line to the ESWEMS Retention Pond. The IST Program requirements for ESWEMS pump testing are located in BBNPP FSAR 3.9.6. The BBNPP COLA Part 4 will be revised as shown below.

The response to RAI 68, Question 16-3, which was submitted in letter BNP-2010-071, dated March 17, 2010 (ML100780390), identifies additional ESWEMS surveillance requirements for verification of manually operated valve positions, automatic valve actuation features, strainer operation and verification that the intake is free of debris.

COLA Impact:

Bullet 4: The BBNPP COLA, Part 4, will be revised as follows.

BASES 3.7.19 ULTIMATE HEAT SINK (UHS)

Plant Specific Technical Specifications

SURVEILLANCE		FREQUENCY
SR 3.7.19.5	Verify the ability to supply makeup water to each UHS basin at ≥ 200 gpm.	24 months (per the IST Program)
SR 3.7.19.12	Verify the ability to recirculate makeup water to the ESWEMS Retention Pond at ≥ 200 gpm.	92 days (per IST Program)

Justification:

The additional Condition, Required Action, and Surveillance Requirements regarding the ESWEMS valve position, automatic valve operation, strainer operation and ESWEMS pump suction flow path, makeup water flow testing, and Retention Pond water level and average water temperature are necessary to ensure that the ESWEMS and Retention Pond remain OPERABLE. The modified Generic Technical Specification Surveillance Requirement verifies BBNPP site-specific design requirements.

Response:

Bullet 5: FSAR Section 9.2.5.6 will be revised to indicate compliance with GL 89-13, Actions I and III.

A 24 month Surveillance Requirement (SR 3.7.19.11) to visually inspect the ESWEMS pump suction inlets for silt or debris, was added by the response to RAI 68, Question 16-3, which was submitted in letter BNP-2010-071, dated March 17, 2010 (ML100780390).

COLA Impact:

Bullet 5: The BBNPP FSAR will be revised as follows.

9.2.5.6 Inspection and Testing Requirements

Finally, periodic surveillance testing of the system, including ~~the safety-related isolation valves and~~ the safety-related recirculation isolation valves, provides continuing assurance of the system's ongoing capability to perform its design function. Surveillance testing includes system performance tests and inspection of individual components, as appropriate to their importance to system function and their tendency to degrade due to their operational conditions and environment.

The ESWEMS inspection and maintenance program complies with Generic Letter 89-13 (NRC, 1989) Actions I and III for open-cycle cooling water systems.

9.2.5.8 References

NRC, 1989. Service Water System Problems Affecting Safety-Related Equipment, Generic Letter 89-13, U.S. Nuclear Regulatory Commission, July 18, 1989.

Response:

Bullet 6: Recirculation valves were previously added by the response to RAI 68, Question 16-3, which was submitted in letter BNP-2010-071, dated March 17, 2010 (ML100780390). The BBNPP COLA, Part 4, will be revised to include instrumentation, controls and piping as shown below.

COLA Impact:

Bullet 6: The BBNPP COLA Part 4, Technical Specifications, will be revised as follows.

3 BASES 3.7.19 ULTIMATE HEAT SINK (UHS)

Plant Specific Technical Specifications:

The Seismic Category I emergency makeup water source to the UHS cooling tower basin, necessary to support 30 days of post accident mitigation is provided by the safety-related Essential Service Water Emergency Makeup System (ESWEMS) that draws water from the ESWEMS Retention Pond. Water is drawn from the ESWEMS Retention Pond by four independent ESWEMS pumps, one for each ESW division. Each ESWEMS pump has its own suction supply from the ESWEMS Retention Pond; there is no shared suction line for any of the ESWEMS pumps. Each ESWEMS train has one pump, a discharge check valve, a strainer, a pump discharge manual isolation valve, instrumentation, controls, piping, and recirculation valves all housed in the ESWEMS Pumphouse. In each ESW Building, a motor operated valve is provided to allow makeup to the associated UHS cooling tower basin. Each ESWEMS pump is rated at 400 gpm.

Response:

Bullet 7: The BBNPP COLA Part 4, Technical Specifications, will be revised as follows.

COLA Impact:

Bullet 7: The BBNPP COLA Part 4, Technical Specifications, will be revised as follows.

3 BASES 3.7.19 ULTIMATE HEAT SINK (UHS)

Plant Specific Technical Specifications:

...with capability for makeup from an OPERABLE source. An OPERABLE emergency makeup water source consists of one OPERABLE train of the ESWEMS capable of providing makeup water to its associated UHS cooling tower basin. Each ESWEMS train includes a pump, strainer, valves, piping, instruments and controls to ensure the transfer of the required supply of water from the ESWEMS Retention Pond to its associated UHS cooling tower.

Question 09.02.05-15:

In accordance with 10 CFR 52.80(a), COL applicants must propose inspections, tests, analyses, and acceptance criteria (ITAAC) that provide reasonable assurance that if the ITAAC are performed and the acceptance criteria met, the facility has been constructed in conformity with the combined license. The NRC staff reviewed the ITAAC proposed in Part 10 of the Bell Bend COL application for ESWEMS, as listed in Table 2.4-19. The staff found that in general the proposed ITAAC are incomplete. A more comprehensive review of the design basis information and important design details and features associated with the ESWEMS (including pumphouse and pond) is needed to establish a complete list of ITAAC that when completed, will provide reasonable assurance that the ESWEMS as constructed will be in conformance with the Bell Bend combined license in accordance with the requirement specified by 10 CFR 52.80(a). Though not intended to be a complete list, the following are examples of issues that were identified by the staff:

- A figure and tables are not provided to uniquely identify the SSCs being inspected, and to clearly specify the arrangement; mechanical design features; I&C design features, displays, and controls; and electric power design features.
- Physical separation is only specified for each mechanical division, but physical separation should also be specified for electrical divisions as well.
- The required flow for the bar screens (Item 14) needs to be specified; and the basis needs to be explained in FSAR Section 9.2.5.
- The capability to provide makeup water (Item 17) needs to specify the limiting conditions that are required.
- Pump NPSH (Item 18) needs to be confirmed by test results against quantitative acceptance criteria, based most limiting conditions of maximum flow, lowest level that will be achieved in the pond after 30 days post accident, and maximum temperature (analysis can be used for temperature correction).
- The dimensions of the pump well (especially depth relative to pump suction and overall height) need to be confirmed.
- Recirculation line discharge back to the pond needs to be confirmed.
- The ITAAC do not stipulate that the ESWEMS is accessible for performing periodic inspections as required by GDC 45.
- No ITAAC are provided to address design requirements for the bar screens and strainers.
- No ITAAC are provided to address design requirements for strainer motors and corresponding power supplies.

Response:

Bullet 1: The ITAAC in Table 2.4-19 will be revised as shown below.

COLA Impacts

Bullet 1: BBNPP COLA, Part 10, ITAAC, Table 2.4-19 will be revised as follows. Table 2.4-19a, Figure 2.4-19a and Figure 2.4-19b will be added to BBNPP COLA Part 10, ITAAC, as follows.

Table 2.4-19 - {Essential Service Water Emergency Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Test, or Analysis	Analysis Acceptance Criteria
1	~~There are four divisions of the ESWEMS.~~ The arrangement of the ESWEMS is physically separated into four electrically independent divisions as shown on Figure 2.4-19a.	a. Type tests, analyses, or a combination of type tests and analyses shall be conducted. ~~Inspection of the as-built system shall be conducted.~~	a. A report exists and concludes that the ~~The as-built~~ ESWEMS conforms to the arrangement as shown in Figure 2.4-19a and ~~has four divisions.~~ is physically separated into four electrically independent divisions as shown on Figure 2.4-19a.
2	Each division of the ESWEMS listed in Table 2.4-19a is independently powered by their respective Class 1E division.	Tests will be performed ~~by powering only one Class 1E division at a time~~.	A report exists that concludes each division of the as-built ESWEMS listed in Table 2.4-19a is independently powered by their respective Class 1E division. ~~Only the Class 1E division under test is powered.~~
3	~~Each mechanical division of the ESWEMS shall be physically separated.~~ Not Used	~~Inspections of the as-built system shall be conducted.~~	~~Each mechanical division of the as-built ESWEMS is physically separated from other mechanical divisions by structural and/or fire barriers.~~
4	~~Each division of the ESWEMS shall be electrically independent.~~ Each division of the ESWEMS equipment identified in Table 2.4-19a shall be physically separated in accordance with IEEE-384 and Reg. Guide 1.75.	~~Inspections and/or analysis of the as-built system shall be conducted.~~ Inspections and/or analysis of the as-built system shall be conducted.	~~For the as-built ESWEMS, electrical isolation exists between each division of Class 1E components and between Class 1E components and non-class 1E components.~~ A report exists which demonstrates that physical separation exists between each division of Class 1E components and between Class 1E components and non-class 1E components for the as-built ESWEMS in accordance with IEEE-384 and Reg. Guide 1.75.

5	The ~~following~~ ESWEMS equipment identified ~~is designated~~ as Seismic Category I; ~~and~~ in Table 2.4-19a ~~is designed to~~ can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of the ~~safety~~ function listed in Table 2.4-19a. ~~1. ESWEMS Pumps.~~ ~~2. ESWEMS Pump Motors.~~ ~~3. Piping to ESWS Cooling Towers.~~ ~~4. Discharge Strainers.~~ ~~5. Motor Operated Valves.~~ ~~6. Isolation Valves.~~ ~~7. Check Valves~~ ~~8. Valves in the pathway from the ESWEMS Pumps to the ESWS ESW Cooling Towers.~~ ~~9. Instruments and Controls.~~ ~~10. Electrical Distribution Equipment~~.	a. Type tests, ~~tests~~, analyses, or a combination of type tests and analyses will be performed on the ESWEMS equipment identified as Seismic Category I in Table 2.4-19a using analytical assumptions, or under conditions which bound the Seismic Category I design requirements.	a. ~~A report exists and concludes that under seismic design basis loads the as-built Seismic Category I ESWEMS equipment is capable of performing intended safety functions.~~ Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the Seismic Category I ESWEMS equipment identified in Table 2.4-19a can withstand seismic design basis loads without a loss of the function listed in Table 2.4-19a.
		b. Inspections will be performed ~~conducted~~ of the as-built ESWEMS equipment identified as Seismic Category I in Table 2.4-19a to verify that the as-built equipment, including equipment supports and restraints, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).	b Inspection reports exist and conclude that the as-built Seismic Category I ~~The~~ ESWEMS equipment ~~designated as Seismic Category I is installed as designed.~~ identified in Table 2.4-19a, including equipment supports and restraints, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).
		~~c. Inspections will be conducted of the as-built equipment supports and restraints.~~	c. ~~The as-built equipment supports and restraints are seismically bounded by tested or analyzed conditions.~~

6	The ESWEMS piping and equipment identified in Table 2.4-19a which could impact the capability of Seismic Category I structures, systems, or components to perform its safety function are designated as Seismic Category II and can withstand design basis seismic loads without impacting the capability of equipment designated as Seismic Category I from performing its safety function.	~~Inspections will be conducted of the as-built equipment.~~ a. Type tests, analyses, or a combination of type tests and analyses will be performed on the Seismic Category II ESWEMS piping and equipment identified in Table 2.4-19a using analytical assumptions, or under conditions which bound the Seismic Category II design requirements, to verify the piping and equipment can withstand seismic design basis loads without impacting the capability of equipment designated Seismic Category I from performing its safety function.	~~The as-built ESWEMS piping and equipment designated as Seismic Category II is installed as designed~~ a. Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the Seismic Category II ESWEMS piping and equipment identified in Table 2.4-19a can withstand seismic design basis loads without impacting the capability of equipment designated Seismic Category I from performing its safety function.
		b. Inspections will be performed of the as-built ESWEMS piping and equipment designated Seismic Category II identified in Table 2.4-19a, including anchorage, to verify piping and equipment are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).	b. Inspection reports exist and conclude that the as-built ESWEMS piping and equipment designated Seismic Category II identified in Table 2.4-19a, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).
7	The ESWEMS Pumphouse bar screens are designated as Seismic Category II, and can withstand design basis seismic loads without impacting the capability of equipment designated as Seismic Category I from performing its safety function.	~~Inspections will be conducted of the as-built equipment.~~ a. Type tests, analyses, or a combination of type tests and analyses will be performed on the Seismic Category II bar screens using analytical assumptions, or under conditions which bound the Seismic Category II design requirements, to verify the piping and equipment can withstand seismic design basis loads without impacting the capability of equipment designated Seismic Category I from performing its safety function.	~~The as-built bar screens are installed as designed.~~ a. Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the Seismic Category II bar screens can withstand seismic design basis loads without impacting the capability of equipment designated Seismic Category I from performing its safety function.
		b. Inspections will be performed of the as-built bar screens, including anchorage, to verify bar screens are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).	b. Inspection reports exist and conclude that the as-built bar screens, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).

8	~~The ASME Code Section III components of the ESWEMS~~ a. Components listed in Table 2.4-19a as ASME Code Section III are designed ~~and constructed~~ to ASME Code Section III requirements.	~~Inspections of the as-built components will be conducted, as documented in the ASME Design Reports.~~ a. Inspections will be performed for the existence of ASME Code Section III Design Reports.	a. ~~The~~ ASME Code Section III design reports (NCA-3550) exist for ~~the as-built ASME Code Section III~~ components ~~of the ESWEMS~~ listed as ASME Code Section III in Table 2.4-19a.
	b. Components listed in Table 2.4-19a as ASME Code Section III are fabricated in accordance with the requirements of ASME Section III.	b. Inspections will be performed of the ASME Code Section III Design Reports (NCA-3550) and associated reference documents.	b. For components listed as ASME Code Section III in Table 2.4-19a, the as-built component satisfies design requirements of ASME Code Section III as demonstrated in the Design Report (NCA-3550).
	c. Components listed in Table 2.4-19a as ASME Code Section III are installed and inspected in accordance with the requirements of ASME Section III.	c. An inspection of the installed components will be performed.	c. For components listed as ASME Code Section III in Table 2.4-19a, reports exist and conclude that installation and inspection are in accordance with ASME Code Section III requirements.
9	~~The ASME Code Section III~~ a. Portions of piping ~~of the ESWEMS~~ shown as in Figure 2.4-19b as ASME Code Section III ~~is~~ are designed ~~and constructed to~~ in accordance with ASME Code Section III requirements.	~~Inspections of the as-built piping will be conducted, as documented in the ASME Design Reports.~~ a. Inspections of the ASME Code Section III Design Reports (NCA-3550) and associated reference documents will be performed.	a. ~~The~~ ASME Code Section III design reports (NCA-3550) exist ~~for the as-built ASME Code Section III piping of the ESWEMS.~~ and conclude that portions of the piping shown as ASME Code Section III in Figure 2.4-19b comply with ASME Code Section III requirements.
	b. Portions of piping shown as ASME Code Section III in Figure 2.4-19b are installed in accordance with Code Section III Design Report.	b. Analyses to reconcile as-built deviations to the ASME Code Design Reports (NCA-3550) will be performed. Piping analyzed using time-history methods will be reconciled to the as-built information.	b. For portions of the piping shown as ASME Code Section III in Figure 2.4-19b, ASME Code Data Reports (N-5) exist and conclude that design reconciliation (NCA-3554) has been completed in accordance with the ASME Code Section III for the as-built system. The report(s) document the as-built condition.
	c. Pressure boundary welds in portions of the piping shown as ASME Code Section III in Figure 2.4-19b are in accordance with ASME Code Section III.	c. Inspections of pressure boundary welds verify that welding is performed in accordance with ASME Code Section III requirements.	c. ASME Code Section III Data Reports exist and conclude that pressure boundary welding for portions of the piping shown as ASME Code Section III in Figure 2.4-19b has been performed in accordance with ASME Code Section III.

10	Pressure boundary welds in portions of the ESWEMS components shown as ASME Code Section III components ~~of the ESWEMS~~ in Figure 2.4-19b are in accordance with ~~are designed and constructed to~~ ASME Code Section III ~~requirements~~.	Inspections of pressure boundary welds verify that welding is performed in accordance with ASME Code Section III requirements. ~~the as-built pressure boundary welds will be conducted.~~	~~A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in as-built ASME Code Section III components of the ESWEMS.~~ ASME Code Section III Data Reports exist and conclude that pressure boundary welding for portions of the ESWEMS components shown as ASME Code Section III in Figure 2.4-19b has been performed in accordance with ASME Code Section III.
11	~~Pressure boundary welds in ASME Code Section III piping of the ESWEMS are designed and constructed to ASME Code Section III requirements.~~ The ASME Code Section III piping design for the ESWEMS shown in Figure 2.4-19b has been reviewed for susceptibility to water hammer.	~~Inspections of the as-built pressure boundary welds will be conducted.~~ a. Analysis of the as-built piping system will be performed to determine if the ESWEMS system piping is susceptible to water hammer and the design modified as necessary to eliminate the possibility of water hammer.	~~A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds in as-built ASME Code Section III piping of the ESWEMS.~~ a. A report exists and concludes the as-built piping system for the ESWEMS is not susceptible to water hammer.
		b. Tests of the as-built system will be conducted to confirm the absence of water hammer.	b. Tests of the as-built system confirm the absence of water hammer.
12	Portions ~~The ASME Code Section III components~~ of the ESWEMS components shown as ASME Code Section III in Figure 2.4-19b retain their pressure boundary integrity at their design pressure.	~~Inspections of the as-built components will be conducted.~~ Hydrostatic tests will be performed on the system.	~~A report exists and concludes that the results of the hydrostatic test of the ASME Code Section III components of the ESWEMS conform to the requirements of the ASME Code.~~ For portions of the ESWEMS components shown as ASME Code Section III in Figure 2.4-19b, ASME Code Section III Data Reports exist and conclude that hydrostatic test results comply with ASME Code Section III requirements.
13	Portions ~~The ASME Code Section III piping~~ of the ESWEMS piping shown as ASME Code Section III in Figure 2.4-19b retain their pressure	~~Inspections of the as-built piping as documented will be conducted.~~ Hydrostatic tests will be performed on the system.	~~A report exists and concludes that the results of the hydrostatic test of the ASME Code Section III piping of the ESWEMS conform to the requirements of the ASME Code.~~

	boundary integrity at their design pressure.		For portions of the ESWEMS piping shown as ASME Code Section III in Figure 2.4-19b, ASME Code Section III Data Reports exist and conclude that hydrostatic test results comply with ASME Code Section III requirements.
14	The ESWEMS Pumphouse bar screens have a large enough face area that potential blockage to the point of preventing the minimum required flow through them is not a concern.	a. Analyses ~~and Inspections~~ will be performed of the ~~as-built~~ equipment.	a. A report exists and concludes that the face area for the as-built ESWEMS Pumphouse bar screens is sufficient to permit the minimum required flow of 310 gpm in the event of worst-case blockage of the screens.
		b. Inspections will be performed of the as-built equipment.	b. A report exists and concludes that the as-built face area for the as-built ESWEMS Pumphouse bar screens agrees with construction drawings and deviations from the approved design are reconciled.
15	~~The strainer blowdown line isolation valves (Class 1E valves in the ESWEMS) will open during the debris filter backwash cycle.~~ Class 1E valves listed in Table 2.4-19a perform the function listed in Table 2.4-19a under system operating conditions.	Tests and analyses or a combination of tests and analyses will be performed to demonstrate the ability of the Class 1E valves listed in Table 2.4-19a to change positions as listed in Table 2.4-19a under system ~~design~~ operating conditions.	~~The as-built strainer blowdown line isolation valves open during the debris filter backwash cycle.~~ The valve changes position as listed Table 2.4-19a under system operating conditions.
16	Each division of the ESWEMS identified in Table 2.4-19a can be initiated manually.	Tests of the as-built system will be conducted.	Each division of the as-built ESWEMS identified in Table 2.4-19a starts upon receipt of a manual initiation signal.
17	Each division of the ~~The~~ ESWEMS identified in Table 2.4-19a provides ≥310 gallons per minute of makeup water with the minimum design pond level and bus voltage ~~in order to maintain the minimum water level in the ESWS cooling tower basins~~.	a. An analysis will be performed to determine that the ESWEMS identified in Table 2.4-19a provides ≥310 gallons per minute of makeup water with the minimum design pond level and bus voltage.	a. A report exists that concludes that each division of the ESWEMS identified in Table 2.4-19a is capable of delivering ≥310 gallons per minute of makeup water with the minimum design pond level and bus voltage.

		b. Tests of the as-built system will be conducted.	b. Each division of the as-built ESWEMS is capable of delivering ~~300~~ > 310 gpm of makeup water ~~to maintain minimum water level in the divisions ESW cooling tower basin~~.
18	The ESWEMS pumps listed in Table 2.4-19a have sufficient NPSH.	~~Analysis of the as-built system will be performed.~~ Testing and analyses will be performed to verify NPSHA for the ESWEMS pumps listed in Table 2.4-19a.	~~A report exists that establishes that the available NPSH exceeds the NPSH required by the pumps installed in the as-built ESWEMS.~~ The ESWEMS pumps listed in Table 2.4-19a have NPSHA that is greater than net positive suction head required (NPSHR) at system rated flow.
19	~~Each division's ESWEMS pump discharge check valve opens when the division's ESWEMS pump is energized and flow is established, and shuts when the division's ESWEMS pump is de-energized.~~ Check valves listed in Table 2.4-19a will function as listed in Table 2.4-19a.	~~Tests of the as-built system will be conducted.~~ Tests will be performed for the operation of the check valves listed in Table 2.4-19a.	~~The ESWEMS pump discharge check valve in each as-built division performs the required function.~~ The check valves listed in Table 2.4-19a perform the functions listed in Table 2.4-19a.
20	In response to control inputs from the associated ESWS cooling tower basin, the ESWEMS control valves (10GFA 10/20/30/40/ AA101), work in conjunction with the ~~ESWS valves that isolate~~ ESWEMS isolation valves ~~flow~~ 30PED10/20/30/40/ AA021 to modulate the flow of water back to the ESWEMS Retention Pond, so that the ESWEMS pumps can operate	Tests of the as-built system will be conducted.	A report exists which demonstrates ~~T~~the ESWEMS control valves in each as-built division modulates ESWEMS flow in conjunction with the ESWS valves that isolate ESWEMS flow.

	within their optimum range.		
21	Each division of the ESWEMS has a surveillance test ~~pump~~ recirculation line to the retention pond as shown in FSAR Figure 2.4-19b that allows flow testing of the system during plant operation	Tests of the as-built system will be conducted.	~~The flow rate in the as-built pump recirculation line is capable of handling 400 gallons per minute.~~ The as-built surveillance test bypass line to the retention pond for each division the ESWEMS as shown in Figure 2.4-19b allows flow testing of the system during plant operation.
22	The dimensions of each ESWEMS pump well and the height of the pump suction above the pump well floor will be verified against the design basis calculations.	Inspections of the as-built system will be conducted.	A report will conclude that the dimensions of each ESWEMS pump well and the height of the pump suction above the pump well floor are consistent with the design basis calculations.
23	Components and piping listed in Table 2.4-19a as ASME Code Section III are accessible for performing periodic inspections.	Inspections of the as-built system will be conducted.	A report will conclude that ASME Code Section III components and piping listed in Table 2.4-19a are accessible for performing periodic inspections.
24	The ESWEMS Pumphouse bar screens are partitioned into maximum 4.9 ft (1.5 m) long sections not to exceed 3,100 in^2 in area. The screen size is 2 in x 0.375 in minimum bars spaced at 0.875 in clear with cross bending bars at 4 in on center. Edges will be banded for added rigidity.	Inspections of the as-built equipment will be conducted.	A report will conclude that ESWEMS Pumphouse bar screens are properly sized for missile barrier protection.
25	The pressure relief backflush process for each ESWEMS automatic strainer listed in Table 2.4-19a is initiated by either the signal of the differential pressure measuring transmitter based on limiting the differential pressure across the strainer to	Tests of the as-built system will be conducted.	A report will conclude that ESWEMS automatic strainers functions to limit differential pressure to 5 psid and can be manually actuated.

the value assumed in the ESWEMS pump sizing basis calculation or manual operator initiation.	

{Table 2.4-19a Essential Service Water Emergency Makeup System (ESWEMS) Component Mechanical Design}

Component Description	Component Tag Number	Component Location	ASME Code Section III	Function	Seismic Category
ESWEMS Pump Division 1	10GFA10AP001	UQF	Class 3	Pressure Boundary /Run	I
Piping to Cooling Tower Division 1		UQF, UZT	Class 3	Pressure Boundary	I
Piping and Manual Valves Division 1		UQF	Class 3	Pressure Boundary	I
Piping Division 1		UQF	B31.1	Pressure Boundary	II
Piping Division 1		UQF	B31.1	Pressure Boundary	NSC
Discharge Strainer Division 1	10GFA10AT001	UQF	Class 3	Pressure Boundary /Run	I
Motor Operated Valves Division 1	10GFA10AA101	UQF	S	Pressure Boundary /Open/Close	I
Motor Operated Valves Division 1	10GFA10AA401	UQF	S	Pressure Boundary /Open/Close	I
Check Valve Division 1	10GFA10AA001	UQF	S	Pressure Boundary /Open/Close	I
ESWEMS Bar Screen Division 1		UQF	NA	-----	II
ESWEMS Pump Division 2	10GFA20AP001	UQF	Class 3	Pressure Boundary /Run	I
Piping to Cooling Tower Division 2		UQF, UZT	Class 3	Pressure Boundary	I
Piping and Manual Valves Division 2		UQF	Class 3	Pressure Boundary	I

Piping Division 2		UQF	B31.1	Pressure Boundary	II
Piping Division 2		UQF	B31.1	Pressure Boundary	NSC
Discharge Strainer Division 2	10GFA20AT001	UQF	Class 3	Pressure Boundary /Run	I
Motor Operated Valves Division 2	10GFA20AA101	UQF	S	Pressure Boundary /Open/Close	I
Motor Operated Valves Division 2	10GFA20AA401	UQF	S	Pressure Boundary /Open/Close	I
Check Valve Division 2	10GFA20AA001	UQF	S	Pressure Boundary /Open/Close	I
ESWEMS Bar Screen Division 2		UQF	NA	-----	II
ESWEMS Pump Division 3	10GFA30AP001	UQF	Class 3	Pressure Boundary /Run	I
Piping to Cooling Tower Division 3		UQF, UZT	Class 3	Pressure Boundary	I
Piping and Manual Valves Division 3		UQF	Class 3	Pressure Boundary	I
Piping Division 3		UQF	B31.1	Pressure Boundary	II
Piping Division 3		UQF	B31.1	Pressure Boundary	NSC
Discharge Strainer Division 3	10GFA30AT001	UQF	Class 3	Pressure Boundary /Run	I
Motor Operated Valves Division 3	10GFA30AA101	UQF	S	Pressure Boundary /Open/Close	I
Motor Operated Valves Division 3	10GFA30AA401	UQF	S	Pressure Boundary /Open/Close	I
Check Valve Division 3	10GFA30AA001	UQF	S	Pressure Boundary /Open/Close	I
ESWEMS Bar Screen Division 3		UQF	NA	-----	II

ESWEMS Pump Division 4	10GFA40AP001	UQF	Class 3	Pressure Boundary /Run	I
Piping to Cooling Tower Division 4		UQF, UZT	Class 3	Pressure Boundary	I
Piping and Manual Valves Division 4		UQF	Class 3	Pressure Boundary	I
Piping Division 4		UQF	B31.1	Pressure Boundary	II
Piping Division 4		UQF	B31.1	Pressure Boundary	NSC
Discharge Strainer Division 4	10GFA40AT001	UQF	Class 3	Pressure Boundary /Run	I
Motor Operated Valves Division 4	10GFA40AA101	UQF	S	Pressure Boundary /Open/Close	I
Motor Operated Valves Division 4	10GFA40AA401	UQF	S	Pressure Boundary /Open/Close	I
Check Valve Division 4	10 GFA40AA001	UQF	S	Pressure Boundary /Open/Close	I
ESWEMS Bar Screen Division 4		UQF	NA	-----	II

Figure 2.4-19a – {ESWEMS Electrical Functional Arrangement}

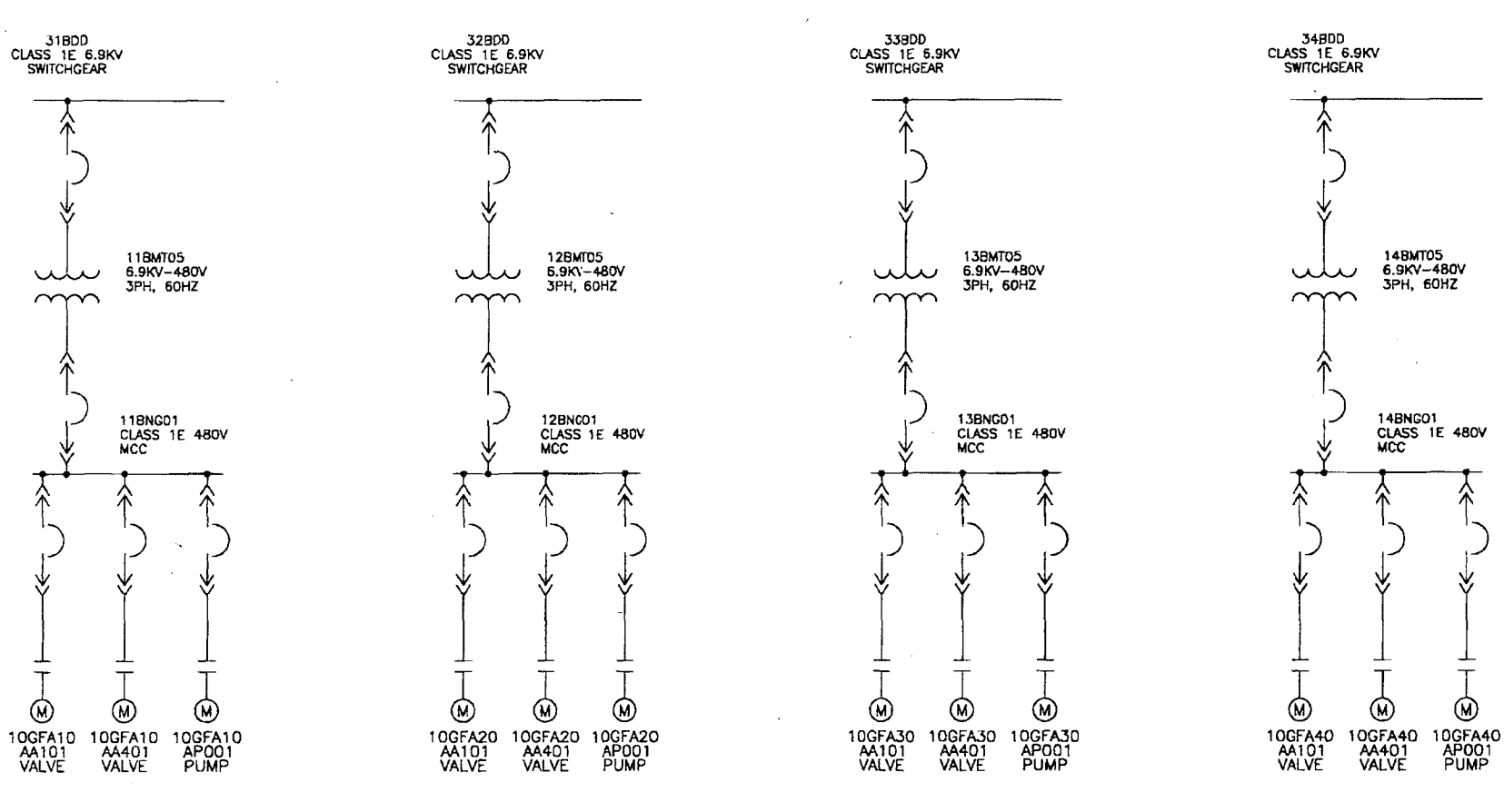
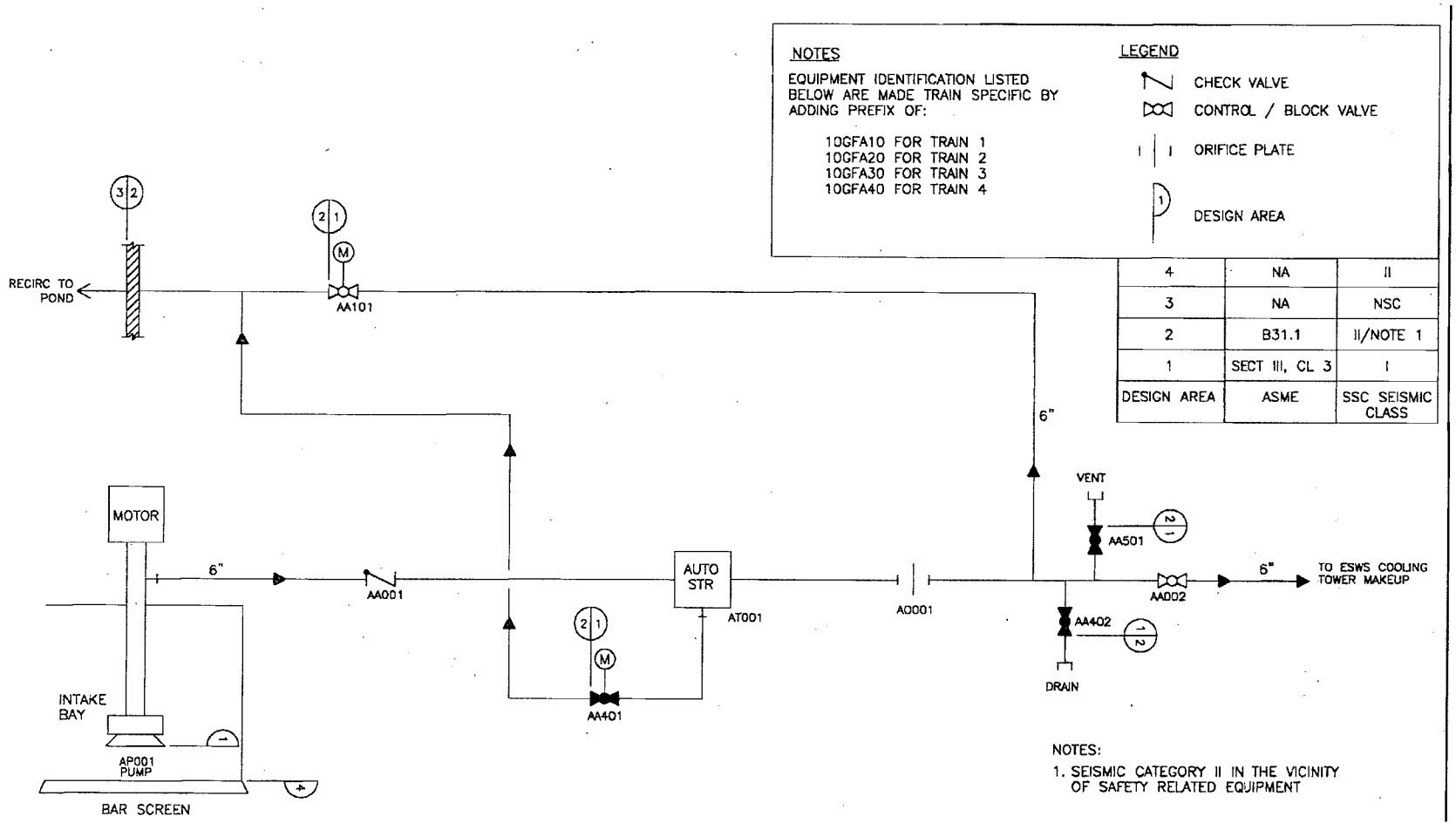


Figure 2.4-19b – {ESWEMS Mechanical Functional Arrangement}



4	NA	II
3	NA	NSC
2	B31.1	II/NOTE 1
1	SECT III, CL 3	I
DESIGN AREA	ASME	SSC SEISMIC CLASS

Response:

Bullet 2: Physical separation of electrical divisions will be added to the Table 2.4-19.

COLA Impact:

BBNPP COLA Part 10, ITAAC, Table 2.4-19, will be revised as follows.

Table 2.4-19 - {Essential Service Water Emergency Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}

4	~~Each division of the ESWEMS shall be electrically independent.~~ Each division of the ESWEMS equipment identified in Table 2.4-19a shall be physically separated in accordance with IEEE-384 and Reg. Guide 1.75.	~~Inspections and/or analysis of the as-built system shall be conducted.~~ Inspections and/or analysis of the as-built system shall be conducted.	~~For the as-built ESWEMS, electrical isolation exists between each division of Class 1E components and between Class 1E components and non-class 1E components.~~ A report exists which demonstrates that physical separation exists between each division of Class 1E components and between Class 1E components and non-class 1E components for the as-built ESWEMS in accordance with IEEE-384 and Reg. Guide 1.75.

Response:

Bullet 3: The design includes bar screens between the ESWEMS Retention Pond and ESWEMS pump suctions. The flow through the bar screens is less than 1 foot/minute. The bar screens are classified as non safety-related because the low velocity of the flow through the screens and normal standby operating status of the ESWEMS make obstruction of the intake by large debris a non-credible event between established surveillance inspections. A 24 month Surveillance Requirement (SR 3.7.19.11) to visually inspect the ESWEMS pump suction inlets for silt or debris, was added by the response to RAI 68, Question 16-3, which was submitted in letter BNP-2010-071, dated March 17, 2010 (ML100780390).
Table 2.4-19, Item 14 will be revised to provide an ITAAC for bar screen flow.
The FSAR and ITAAC will be revised as shown below.

COLA Impact:

Bullet 3: The BBNPP FSAR will be revised as follows.

9.2.5.3 Component Description

ESWEMS Pumphouse Bar Screens

They prevent debris from passing into the ESWEMS pumps, and subsequently into the Essential Service Water System heat exchangers, as well as the intercoolers, lube oil coolers, and water jackets of the emergency diesel generators. The influent flow past the bar screens (less than one foot per minute) is not sufficient enough to warrant an automatic screen wash system. The screens can be cleaned at regular maintenance intervals.

The BBNPP COLA Part 10, ITAAC, Table 2.4-19, will be revised as follows:

Table 2.4-19 - {Essential Service Water Emergency Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}

14	The ESWEMS Pumphouse bar screens have a large enough face area that potential blockage to the point of preventing the minimum required flow through them is not a concern.	a. Analyses ~~and Inspections~~ will be performed of the ~~as-built~~ equipment.	a. A report exists and concludes that the face area for the as-built ESWEMS Pumphouse bar screens is sufficient to permit the minimum required flow of 310 gpm in the event of worst-case blockage of the screens.
		b. Inspections will be performed of the as-built equipment.	b. A report exists and concludes that the as-built face area for the as-built ESWEMS Pumphouse bar screens agrees with construction drawings and deviations from the approved design are reconciled.

Response:

Bullet 4: The limiting condition for testing the ESWEMS pump capacity is the minimum design water level in the ESWEMS Retention Pond and minimum design bus voltage. The ITAAC will be revised as shown below.

COLA Impact:

Bullet 4: The BBNPP COLA Part 10, ITAAC, Table 2.4-19, will be revised as follows.

Table 2.4-19 - {Essential Service Water Emergency Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}

17	Each division of the ESWEMS identified in Table 2.4-19a provides ≥310 gallons per minute of makeup water with the minimum design pond level and bus voltage.	a. An analysis will be performed to determine that the ESWEMS identified in Table 2.4-19a provides ≥310 gallons per minute of makeup water with the minimum design pond level and bus voltage.	a. A report exists that concludes that each division of the ESWEMS identified in Table 2.4-19a is capable of delivering ≥310 gallons per minute of makeup water with the minimum design pond level and bus voltage.

Response:

Bullet 5: Net positive suction head available is calculated at a water elevation of zero feet above the eye of the pump. If a vertical pump is used, then there will be no additional head requirements from a suction pipe due to the eye of the pump being submerged. Based on this analysis, no additional pond volume is needed to account for NPSH if a submerged vertical pump with a required NPSH less than 32 feet is used. The procured vertical pump shall be capable of pumping rated flow with 32 feet of NPSH.

The ESWEMS pumps will be 400 gpm minimum, vertical pumps with a minimum developed head of 100 feet.

The system pressure loss calculation includes 20% margin to account for aging and fouling and a 5 psi drop across the automatic strainer. The 400 gpm capacity of the ESWEMS pumps results in 29% margin over the required flow rate of 310 gpm.

The minimum allowable head of the ESWEMS pump provides 107% margin over the 48 ft required head of the system, which includes the 20% aging and fouling factor. The ITAAC will be revised as shown below.

COLA Impact:

Bullet 5: The BBNPP COLA Part 10, ITAAC, Table 2.4-19, will be revised as follows.

Table 2.4-19 - {Essential Service Water Emergency Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}

18	The ESWEMS pumps listed in Table 2.4-19a have sufficient NPSH.	~~Analysis of the as-built system will be performed.~~ Testing and analyses will be performed to verify NPSHA for the ESWEMS pumps listed in Table 2.4-19a.	~~A report exists that establishes that the available NPSH exceeds the NPSH required by the pumps installed in the as-built ESWEMS.~~ The ESWEMS pumps listed in Table 2.4-19a have NPSHA that is greater than net positive suction head required (NPSHR) at system rated flow.

Response:

Bullet 6: The pump well dimensions and the minimum distance from the pump end bell to the bottom of the well will be confirmed. The ITAAC will be revised as shown below.

COLA Impact:

Bullet 6: The BBNPP COLA Part 10, ITAAC, Table 2.4-19, will be revised as follows.

Table 2.4-19 - {Essential Service Water Emergency Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}

22	The dimensions of each ESWEMS pump well and the height of the pump suction above the pump well floor will be verified against the design basis calculations.	Inspections of the as-built system will be conducted.	A report will conclude that the dimensions of each ESWEMS pump well and the height of the pump suction above the pump well floor are consistent with the design basis calculations.

Response:

Bullet 7: ITAAC 21 in Table 2.4-19 verifies the recirculation line capability of handling 400 gpm. This ITAAC will be revised to add the recirculated water destination as shown below.

COLA Impact:

Bullet 7: The BBNPP COLA Part 10, ITAAC, Table 2.4-19, will be revised as follows.

Table 2.4-19 - {Essential Service Water Emergency Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}

21	Each division of the ESWEMS has a surveillance test ~~pump~~ recirculation line to the retention pond as shown in FSAR Figure 2.4-19b that allows flow testing of the system during plant operation	Tests of the as-built system will be conducted.	The as-built surveillance test bypass line to the retention pond for each division the ESWEMS as shown in Figure 2.4-19b allows flow testing of the system during plant operation.

Response:

Bullet 8: The ITAAC will be revised to verify that the ESWEMS is accessible for performing periodic inspections as required by GDC 45 as shown below.

COLA Impact:

Bullet 8: The BBNPP COLA Part 10, ITAAC, Table 2.4-19, will be revised as follows.

Table 2.4-19 - {Essential Service Water Emergency Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}

23	Components and piping listed in Table 2.4-19a as ASME Code Section III are accessible for performing periodic inspections.	Inspections of the as-built system will be conducted.	A report will conclude that ASME Code Section III components and piping listed in Table 2.4-19a are accessible for performing periodic inspections.

Response:

Bullet 9: The ITAAC will be revised to verify bar screen and strainer design requirements as shown below.

COLA Impact:

Bullet 9: The BBNPP COLA Part 10, ITAAC, Table 2.4-19, will be revised as follows.

Table 2.4-19 - {Essential Service Water Emergency Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}

24	The ESWEMS Pumphouse bar screens are partitioned into maximum 4.9 ft (1.5 m) long sections not to exceed 3,100 in^2 in area. The screen size is 2 in x 0.375 in minimum bars spaced at 0.875 in clear with cross bending bars at 4 in on center. Edges will be banded for added rigidity.	Inspections of the as-built equipment will be conducted.	A report will conclude that ESWEMS Pumphouse bar screens are properly sized for missile barrier protection.
25	The pressure relief backflush process for each ESWEMS automatic strainer listed in Table 2.4-19a is initiated by either the signal of the differential pressure measuring transmitter based on limiting the differential pressure across the strainer to the value	Tests of the as-built system will be conducted.	A report will conclude that ESWEMS automatic strainers functions to limit differential pressure to 5 psid and can be manually actuated.

assumed in the ESWEMS pump sizing basis calculation or manual operator initiation.		

Response:

Bullet 10: Table 2.4-19 ITAAC Item 1 confirms that strainers are fed from the correct safety-related buses. ITAAC Item 5 confirms that strainers are qualified to Seismic Category I requirements.

COLA Impact:

Bullet 10: The BBNPP COLA Part 10, ITAAC, Table 2.4-19, will be revised as follows.

Table 2.4-19 - {Essential Service Water Emergency Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}

1	~~There are four divisions of the ESWEMS.~~ The arrangement of the ESWEMS is physically separated into four electrically independent divisions as shown on Figure 2.4-19a.	a. Type tests, analyses, or a combination of type tests and analyses shall be conducted. ~~Inspection of the as-built system shall be conducted.~~	a. A report exists and concludes that the ~~The as-built~~ ESWEMS conforms to the arrangement as shown in Figure 2.4-19a and ~~has four divisions.~~ is physically separated into four electrically independent divisions as shown on Figure 2.4-19a.
5	The ~~following~~ ESWEMS equipment identified ~~is designated~~ as Seismic Category I~~, and~~ in Table 2.4-19a ~~is designed to~~ can withstand ~~a~~ seismic design basis ~~seismic~~ loads without loss of the ~~safety~~ function listed in Table 2.4-19a. ~~1. ESWEMS Pumps. 2. ESWEMS Pump Motors.~~	a. Type tests, tests, analyses, or a combination of type tests and analyses will be performed on the ESWEMS equipment identified as Seismic Category I in Table 2.4-19a using analytical assumptions, or under conditions which bound the Seismic Category I design requirements.	a. ~~A report exists and concludes that under seismic design basis loads the as-built Seismic Category I ESWEMS equipment is capable of performing intended safety functions.~~ Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the Seismic Category I ESWEMS equipment identified in Table 2.4-19a can withstand seismic design basis seismic loads without a loss of the function listed in Table 2.4-19a.

~~3. Piping to ESWS Cooling Towers.~~ ~~4. Discharge Strainers.~~ ~~5. Motor Operated Valves.~~ ~~6. Isolation Valves.~~ ~~7. Check Valves~~ ~~8. Valves in the pathway from the ESWEMS Pumps to the ESWS ESW Cooling Towers.~~ ~~9. Instruments and Controls.~~ ~~10. Electrical Distribution Equipment~~.		
	b. Inspections will be performed ~~conducted~~ of the as-built ESWEMS equipment identified as Seismic Category I in Table 2.4-19a to verify that the as-built equipment, including equipment supports and restraints, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).	b Inspection reports exist and conclude that the as-built Seismic Category I ~~The~~ ESWEMS equipment ~~designated as Seismic Category I is installed as designed.~~ identified in Table 2.4-19a, including equipment supports and restraints, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).
	~~c. Inspections will be conducted of the as-built equipment supports and restraints.~~	~~c. The as-built equipment supports and restraints are seismically bounded by tested or analyzed conditions.~~