Exelon Generation®

10 CFR 50.90

June 5, 2014

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Peach Bottom Atomic Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-44 and DPR-56
NRC Docket Nos. 50-277 and 50-278

Subject: Extended Power Uprate License Amendment Request – Supplement 27 Supplemental Information

Reference:

1. Exelon letter to the NRC, "License Amendment Request - Extended Power Uprate," dated September 28, 2012 (ADAMS Accession No. ML122860201)
2. Exelon letter to the NRC, "Supplemental Information Supporting Request for License Amendment Request - Extended Power Uprate – Supplement 9," dated August 22, 2013 (ADAMS Accession No. ML13240A002)

In accordance with 10 CFR 50.90, Exelon Generation Company, LLC (EGC) requested amendments to Renewed Facility Operating License Nos. DPR-44 and DPR-56 for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3, respectively (Reference 1). Specifically, the proposed changes would revise the Renewed Facility Operating Licenses (RFOLs) to implement an increase in rated thermal power from 3514 megawatts thermal (MWt) to 3951 MWt. EGC performed an impact review of RFOL Amendments issued since submittal of the proposed extended power uprate (EPU) license amendment (Reference 1). Several recently approved RFOL amendments changed Technical Specifications (TS) that affect the proposed EPU TS changes. Therefore, revised TS page markups are being provided to clearly delineate the EPU-required changes from the approved TS. This letter also provides minor corrections to values reported in the Power Uprate Safety Analysis Report (PUSAR) provided in Attachment 6 of Reference 1. Additionally, this letter provides a revised response to SRXB-RAI-24 that was provided in Supplement 9 (Reference 2). These corrections do not impact the previously provided conclusions.

A description of the TS changes are included in Attachment 1. Revised markups of the affected TS pages are provided in Attachment 2. Revised markups of the affected TS Bases pages are provided for information only in Attachment 3.

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In addition, the cover to the EPU amendment request (Reference 1) described EGC's plan for implementation of the EPU amendment. The following statement amends the original implementation plan:

> Once approved, the amendment will be implemented prior to startup from refueling outage P2R20 for Unit 2 and P3R20 for Unit 3.

EGC has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration provided to the U. S. Nuclear Regulatory Commission in Reference 1. The supplemental information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. Further, the additional information provided in this submittal does not affect the bases for EGC concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the Commonwealth of Pennsylvania and the State of Maryland of this application by transmitting a copy of this letter with attachments to the designated State Officials.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this letter, please contact Mr. David Neff at (610) 765-5631.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 5th day of June 2014.

Respectfully,

Kevin F Borton
Sr. Manager, Licensing – Power Uprate
Exelon Generation Company, LLC

Attachments
1. Description of Supplemental Information and Technical Specifications Changes
2. Technical Specifications Marked Up Pages
3. Technical Specifications Bases Marked Up Pages

cc:	USNRC Region I, Regional Administrator	w/attachments
	USNRC Senior Resident Inspector, PBAPS	w/attachments
	USNRC Project Manager, PBAPS	w/attachments
	R. R. Janati, Commonwealth of Pennsylvania	w/attachments
	S. T. Gray, State of Maryland	w/attachments

Attachment 1

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

DESCRIPTION OF SUPPLEMENTAL INFORMATION and TECHNICAL SPECIFICATIONS CHANGES

DESCRIPTION OF SUPPLEMENTAL INFORMATION and TECHNICAL SPECIFICATIONS CHANGES

1.0 INTRODUCTION

Exelon Generation Company, LLC (EGC) submitted a License Amendment Request (LAR) for an Extended Power Uprate (EPU) for the Peach Bottom Atomic Power Station (PBAPS) Units 2 and 3 on September 28, 2012 (Reference 1). This letter provides supplemental information regarding:

- Two PBAPS Renewed Facility Operating License (RFOL) Amendments were issued following the EPU LAR submittal and included TS that affect the EPU-proposed changes.
  - Amendment Nos. 290 and 293, for Unit 2 and Unit 3, approving the implementation of a 3% lift setpoint tolerance for the Safety Relief Valves (SRVs) and Safety Valves (SVs) (Reference 2).
  - Amendment Nos. 288 and 291, for Unit 2 and Unit 3, approving the addition of the Drywell Spray function into the TS as Section 3.6.2.5 (Reference 3).

- Corrections to reflect the impact of a recent analysis revision to better account for reactor recirculation pump inertia in the transient analysis. These corrections have a small effect on results provided in the Power Uprate Safety Analysis Report (PUSAR) (Reference 1, Attachment 6). The conclusions regarding the capability of the plant to safely respond and mitigate the events are not affected.

- Correction of the response to SRXB-RAI-24 contained in Supplement 9 (Reference 5) regarding Reactor Core Isolation Cooling (RCIC) system pump fluid temperature. The conclusion regarding the capability of the RCIC system to operate within design limits is not affected.

A detailed description and technical justification of each of these changes are provided in the following sections of this attachment. Revised markups of the affected TS pages are provided in Attachment 2. Revised markups of the affected TS Bases pages are provided for information only in Attachment 3.

2.0 SAFETY RELIEF VALVE SETPOINT TOLERANCE

The NRC issued Amendments 290 (Unit 2) and 293 (Unit 3) on May 5, 2014 (Reference 2). These amendments revised the TSs to: (1) increase the allowable as-found safety relief valve (SRV) and safety valve (SV) lift setpoint tolerance from ± 1% to ± 3%; (2) increase the required number of operable SRVs and SVs from 11 to 12; and (3) increase the Standby Liquid Control System (SLCS) pump discharge pressure from 1255 psig to 1275 psig. These amendments included three revised TS pages for each unit:

- TS page 3.1-23 was revised to reflect a higher SLCS pump discharge pressure of 1275 psig in TS Surveillance Requirement (SR) 3.1.7.8.

- TS page 3.4-8 was revised to reflect the revised Limiting Condition for Operation (LCO) to require the operability of 12 valves.

- TS page 3.4-9 was revised to reflect the new lift setpoint tolerances for the SRVs and SVs.

The EPU LAR, as described in Reference 1, Attachment 1, included EPU-required changes to each of these pages. The impact to the EPU proposed TS due to the approved amendments, is described below:

- The EPU LAR had proposed the SLCS discharge pressure in TS SR 3.1.7.8 be revised from ≥ 1255 psig to ≥ 1265 psig. The value of 1275 psig approved in the recent amendments bounds the proposed EPU requirement. As such, EGC withdraws the proposed change to the SLCS pump discharge pressure value in TS SR 3.1.7.8. The revised markup of this page reflects there is no EPU change associated with this parameter.

  The other EPU changes proposed to this page, or the analyses on which they were based, are not affected by the issued SRV/SV lift setpoint tolerance amendments.

- The EPU LAR had proposed a change to TS 3.4.3.1 LCO to increase the total number of operable SRVs/SVs to 13. The revised markup of this page reflects the EPU required increase from 12 valves to 13 valves.

- The original EPU LAR analyses also used the more conservative 3% lift setpoint tolerance value for each SRV and SV. There is no impact on the EPU LAR due to the 3% lift setpoint values established in Amendments 290/293. However, the lift setpoint values in TS SR 3.4.3.1 now reflect the 3% tolerance.

  The other EPU change proposed to this page, or the analyses on which it was based, is not affected by the issued SRV/SV lift setpoint tolerance amendments.

Markups of the recently approved TS pages 3.1-23, 3.4-8 and 3.4-9 reflecting these EPU changes are included in Attachment 2. Markups of the affected TS Bases pages are included for information only in Attachment 3.

3.0 DRYWELL SPRAY TECHNICAL SPECIFICATION

The NRC issued Amendments 288 (Unit 2) and 291 (Unit 3) on June 18, 2013 (Reference 3). These amendments added TS 3.6.2.5 to address requirements for the Drywell Spray function of the Residual Heat Removal System. Drywell Spray is a mode of the RHR system which is assumed to be initiated under post-accident conditions to reduce the temperature and pressure of the primary containment atmosphere. These amendments included two new TS pages for each unit: 3.6-30a and 3.6-30b.

As discussed in the EPU LAR (Reference 1) Attachment 1, PBAPS is implementing modifications to eliminate the need for containment accident pressure credit in assuring adequate net positive suction head (NPSH) is available for the Emergency Core Cooling Systems (ECCS) pumps. One of these modifications is the RHR cross-tie modification. This change will enable the flow from a single RHR pump to be divided between two RHR heat exchangers.

EPU safety analyses assume that, at one hour into the response to certain design basis events, the RHR cross-tie valve is opened to establish a containment cooling configuration. Control switches in the Control Room will provide the operator with the capability to transfer power for the motor-operated RHR cross-tie and RHR flow control valves from the normal source to the alternate source to assure the availability of this cooling function when needed.

10 CFR 50.36 (c)(3), Surveillance Requirements, states "Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met." Because the PBAPS RHR system cross-tie modification relies on the capability for the selected valves to be powered from a normal source or an alternate source, it is appropriate to include a verification of this ability in the TS.

In EPU LAR Supplement 5 (Reference 4), PBAPS proposed the addition of two new TS SR, SR 3.6.2.3.3 for the RHR Suppression Pool Cooling TS and SR 3.6.2.4.3 for the RHR Suppression Pool Spray TS. These SRs provide for the verification of the power transfer capability for the RHR cross-tie and RHR flow control valves. With the implementation of the TS for Drywell Spray, a new TS SR is needed to support the same EPU design basis for this RHR system function. Specifically, the capability to transfer power for the motor-operated RHR cross-tie and RHR flow control valves for the containment cooling functions of the RHR system is relied upon in the safety analyses.

The following TS SR 3.6.2.5.3 is proposed to be conducted in accordance with the Surveillance Frequency Control Program:

> Verify manual transfer capability of power supply for the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve from the normal to the alternate source.

In addition, similar to the proposed RHR suppression pool cooling and RHR suppression pool spray bases (TS bases sections 3.6.2.3 and 3.6.2.4, respectively), the RHR cross-tie description will be added to the Background and LCO sections of the RHR Drywell Spray TS bases.

A markup of the affected TS page 3.6-30b is provided in Attachment 2 and a markup of the affected TS Bases pages are provided for information only in Attachment 3.

4.0 REACTOR RECIRCULATION PUMP INERTIA

A re-evaluation of the EPU ATWS analysis regarding the reactor recirculation pump-motor inertia resulted in a small reduction in the margin for the peak vessel bottom pressure. The results of the original EPU analysis are provided in PUSAR Section 2.8.5.7, Anticipated Transients Without Scram and Table 2.8-8, PBAPS Results for ATWS Analysis. Based on the revised analysis, the peak vessel bottom pressure in Table 2.8-8 increased slightly from 1458 to 1461 psig. This remains well below the ASME Service Level C limit of 1500 psig. The values for the other parameters in Table 2.8-8 (peak clad temperature (PCT), suppression pool temperature, containment pressure and cladding oxidation) conservatively bound the resulting values in the new analysis and are not being revised in this supplement.

The above increase in the peak vessel bottom pressure results in a minor (i.e., 1 psi) impact on certain SLCS parameters described in the PUSAR. These impacts are detailed below:

PUSAR Section	Parameter	Original PUSAR Value	New PUSAR Value
2.2.4.2	Maximum SLCS pump discharge pressure during ATWS	1265 psig	1266 psig
2.8.4.5.2	Peak vessel lower plenum pressure at SLCS initiation	1190.3 psig / 1205 psia	1191.3 psig / 1206 psia
2.8.4.5.2	SLCS Relief Valve setpoint margin	185 psi	184 psi
2.8.5.7.1	Peak vessel lower plenum pressure at SLCS initiation	1205 psia	1206 psia

As part of the recently approved RFOL Amendments 290/293 discussed in Section 2.0 of this supplement, the TS SR 3.1.7.8 for the SLCS pump discharge pressure was increased to ≥ 1275 psig. Since this bounds the maximum SLCS pump discharge pressure during an ATWS event at EPU conditions, there will be no EPU-related TS change proposed to this parameter.

The conclusions of the ATWS and SLCS evaluations in the PUSAR are unchanged regarding the acceptance criteria following implementation of the proposed EPU.

5.0 CORRECTION OF RESPONSE TO SRXB-RAI-24

During the review of the NRC draft Safety Evaluation Report for the PBAPS EPU LAR to verify the factual accuracy of the information, EGC identified that information provided in response to the SRXB-RAI-24 in Supplement 9 (Reference 5) was in error. The related information in the response to SRXB-RAI-30 has been confirmed to be correct. Changes to the response to SRXB-RAI-24 is provided below with additions indicated by **bolded** characters and deletions indicated with ~~strikethrough~~ markers. The NRC had asked:

> *Are there any instances under EPU conditions where the pump would be operating outside of this temperature range? If so, what are the conditions and how are they addressed for this EPU?*

The EGC response is hereby corrected to read:

> The only EPU analyses in which RCIC operation is credited are: Appendix R Method A (described in Reference 24-1 Section 2.5.1.4), Station Blackout (described in Reference 24-1 Section 2.3.5), ATWS (described in Reference 24-1 Section 2.8.5.7) and Loss of Feedwater Flow Event (described in Reference 24-1 Section 2.8.5.2.3.1). For the loss of feedwater flow event, there is no elevated suppression pool temperature. For the Appendix R~~, Station Blackout~~ and ATWS analyses, the RCIC pump suction source credited is exclusively from the

condensate storage tank, which has a temperature range of 40 °F to 140 °F. **For the Station Blackout event, RCIC is aligned to the suppression pool for approximately 0.3 hours. The suppression pool temperature peaks at 163 °F during RCIC operation. In order to mitigate certain events, such as SBO, system analysis has shown that RCIC can operate up to 4 hours at 180 °F.** ~~Therefore, there are no safety analyses for EPU where RCIC would operate outside the design temperature range of 40 °F to 140 °F.~~

6.0 REFERENCES

1. Exelon letter to the NRC, "License Amendment Request - Extended Power Uprate," dated September 28, 2012 (ADAMS Accession No. ML122860201)
2. NRC letter to Exelon, "Issuance of Amendments Re: Safety Relief Valve and Safety Valve Lift Setpoint Tolerance," dated May 5, 2014 (ADAMS Accession No. ML14079A102)
3. NRC letter to Exelon, "Issuance of Amendments Re: Revise Technical Specifications to Add Residual Heat Removal System Drywell Spray Function Requirements," dated June 18, 2013 (ADAMS Accession No. ML13109A463)
4. Exelon letter to the NRC, "Supplemental Information Supporting Request for License Amendment Request - Extended Power Uprate – Supplement 5," dated June 27, 2013 (ADAMS Accession No. ML13182A025)
5. Exelon letter to the NRC, "Supplemental Information Supporting Request for License Amendment Request - Extended Power Uprate – Supplement 9," dated August 22, 2013 (ADAMS Accession No. ML13240A002)

Attachment 2

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

<u>TECHNICAL SPECIFICATIONS MARKED UP PAGES</u>

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.1.7.7	~~Verify the quantity of B-10 stored in the SLC tank is ≥ 162.7 lbm.~~ Deleted	~~In accordance with the Surveillance Frequency Control Program.~~
SR 3.1.7.8	Verify each pump develops a flow rate ≥ ~~43.0~~ 49.1 gpm at a discharge pressure ≥ 1275 psig.	In accordance with the Inservice Testing Program
SR 3.1.7.9	Verify flow through one SLC subsystem from pump into reactor pressure vessel.	In accordance with the Surveillance Frequency Control Program.
SR 3.1.7.10	Verify sodium pentaborate atom percent B-10 ~~enrichment is within the limits of Table 3.1.7-1.~~ enrichment to ≥ 92.0	In accordance with the Surveillance Frequency Control Program **AND** Once within 8 hours after addition to SLC tank

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.3 Safety Relief Valves (SRVs) and Safety Valves (SVs)

LCO 3.4.3 The safety function of ~~12~~ 13 valves (any combination of SRVs and SVs) shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required SRVs or SVs inoperable.	A.1 Be in MODE 3.	12 hours
	<u>AND</u>	
	A.2 Be in MODE 4.	36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.4.3.1	Verify the safety function lift setpoints of the required SRVs and SVs are as follows: Number of SRVs / Setpoint (psig) 4 / 1135 ± 34.1 4 / 1145 ± 34.4 3 / 1155 ± 34.7 Number of SVs / Setpoint (psig) ~~2~~ 3 / 1260 ± 37.8 Following testing, lift settings shall be within ± 1%.	In accordance with the Inservice Testing Program
SR 3.4.3.2	Verify each required SRV actuator strokes when manually actuated in the depressurization mode.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.2.5.1	Verify each RHR drywell spray subsystem manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position is in the correct position or can be aligned to the correct position.	In accordance with the Surveillance Frequency Control Program.
SR 3.6.2.5.2	Verify each drywell spray nozzle is unobstructed.	In accordance with the Surveillance Frequency Control Program.

SR 3.6.2.5.3 Verify manual transfer capability of power supply for the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve from the normal source to the alternate source.

In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.1.7.7	~~Verify the quantity of B-10 stored in the SLC tank is ≥ 162.7 lbm.~~ Deleted	~~In accordance with the Surveillance Frequency Control Program.~~
SR 3.1.7.8	Verify each pump develops a flow rate ≥ ~~43.0~~ 49.1 gpm at a discharge pressure ≥ 1275 psig.	In accordance with the Inservice Testing Program
SR 3.1.7.9	Verify flow through one SLC subsystem from pump into reactor pressure vessel.	In accordance with the Surveillance Frequency Control Program.
SR 3.1.7.10	Verify sodium pentaborate atom percent B-10 ~~enrichment is within the limits of Table 3.1.7-1.~~ enrichment to ≥ 92.0.	In accordance with the Surveillance Frequency Control Program AND Once within 8 hours after addition to SLC tank

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.3 Safety Relief Valves (SRVs) and Safety Valves (SVs)

LCO 3.4.3 The safety function of ~~12~~ 13 valves (any combination of SRVs and SVs) shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required SRVs or SVs inoperable.	A.1 Be in MODE 3. AND A.2 Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.3.1	Verify the safety function lift setpoints of the required SRVs and SVs are as follows: Number of SRVs — Setpoint (psig) 4 — 1135 ± 34.1 4 — 1145 ± 34.4 3 — 1155 ± 34.7 Number of SVs — Setpoint (psig) ~~2~~ 3 — 1260 ± 37.8 Following testing, lift settings shall be within ± 1%.	In accordance with the Inservice Testing Program
SR 3.4.3.2	Verify each required SRV actuator strokes when manually actuated in the depressurization mode.	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.2.5.1	Verify each RHR drywell spray subsystem manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position is in the correct position or can be aligned to the correct position.	In accordance with the Surveillance Frequency Control Program.
SR 3.6.2.5.2	Verify each drywell spray nozzle is unobstructed.	In accordance with the Surveillance Frequency Control Program.

SR 3.6.2.5.3 Verify manual transfer capability of power supply for the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve from the normal source to the alternate source.

In accordance with the Surveillance Frequency Control Program.

Attachment 3

Peach Bottom Atomic Power Station Units 2 and 3

NRC Docket Nos. 50-277 and 50-278

<u>TECHNICAL SPECIFICATIONS BASES MARKED UP PAGES</u>

<u>FOR INFORMATION ONLY</u>

BASES

SURVEILLANCE REQUIREMENTS

~~SR 3.1.7.7 (continued)~~

~~cooldown in the normal manner. The required quantity contains an additional amount of B-10 equal to 25% of the minimum required amount of B-10 necessary to shutdown the reactor, to account for potential leakage and imperfect mixing. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.~~

SR 3.1.7.8

Demonstrating that each SLC System pump develops a flow rate ≥ ~~43.0~~ 49.1 gpm at a discharge pressure ≥ 1275 psig ensures that pump performance has not degraded below design values during the fuel cycle. This minimum pump flow rate requirement ensures that, when combined with the sodium pentaborate solution concentration requirements, the rate of negative reactivity insertion from the SLC System will adequately compensate for the positive reactivity effects encountered during power reduction, cooldown of the moderator, and xenon decay. The rate of negative reactivity insertion is increased by using highly enriched boron in the SLC System solution that increases the rate of Boron-10 injection and functions to shutdown the reactor core faster. This limits the heat generated that is transferred to the suppression pool during an ATWS event. Limiting the heat transferred to the suppression pool maintains the pool below design limits, which ensures adequate NPSH is available for the ECCS pumps without credit for containment accident pressure. This test confirms one point on the pump design curve and ~~This test~~ is indicative of overall performance. Such inservice inspections confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance. ~~In addition, the test results for each pump are used to determine that the limits of Table 3.1.7-1 are satisfied for each SLC subsystem.~~ The Frequency of this Surveillance is in accordance with the Inservice Testing Program.

SR 3.1.7.9

This Surveillance ensures that there is a functioning flow path from the boron solution storage tank to the RPV, including the firing of an explosive valve. The replacement charge for the explosive valve shall be from the same manufactured batch as the one fired or from another batch that has been certified by having one of that batch successfully fired. The Surveillance may be performed in separate steps to prevent injecting boron into the RPV. An acceptable method for verifying flow from the pump to the RPV is to pump demineralized water from a test tank through one SLC subsystem and into the RPV. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

The overpressure protection system must accommodate the most severe pressurization transient. Evaluations have determined that the most severe transient is the closure of all main steam isolation valves (MSIVs), followed by reactor scram on high neutron flux (i.e., failure of the direct scram associated with MSIV position) (Ref. 1). For the purpose of the analyses, ~~12~~ 13 SRVs and SVs are assumed to operate in the safety mode. The analysis results demonstrate that the design SRV and SV capacity is capable of maintaining reactor pressure below the ASME Code limit of 110% of vessel design pressure (110% x 1250 psig = 1375 psig). This LCO helps to ensure that the acceptance limit of 1375 psig is met during the Design Basis Event.

From an overpressure standpoint, the design basis events are bounded by the MSIV closure with flux scram event described above. Reference 2 discusses additional events that are expected to actuate the SRVs and SVs. Although not a design basis event, the ATWS analysis demonstrates that peak vessel bottom pressure is less than the ASME Service Level C limit of 1,500 psig.

SRVs and SVs satisfy Criterion 3 of the NRC Policy Statement.

LCO

The safety function of any combination of ~~12~~ 13 SRVs and SVs are required to be OPERABLE to satisfy the assumptions of the safety analysis (Refs. 1 and 2). Regarding the SRVs, the requirements of this LCO are applicable only to their capability to mechanically open to relieve excess pressure when the lift setpoint is exceeded (safety mode).

The SRV and SV setpoints are established to ensure that the ASME Code limit on peak reactor pressure is satisfied. The ASME Code specifications require the lowest safety valve setpoint to be at or below vessel design pressure (1250 psig) and the highest safety valve to be set so that the total accumulated pressure does not exceed 110% of the design pressure for overpressurization conditions. The transient evaluations in the UFSAR are based on these setpoints, but also include the additional uncertainties of + 3% of the nominal setpoint to provide an added degree of conservatism.

Operation with fewer valves OPERABLE than specified, or with setpoints outside the ASME limits, could result in a more severe reactor response to a transient than predicted, possibly resulting in the ASME Code limit on reactor pressure being exceeded.

(continued)

B 3.6 CONTAINMENT SYSTEMS

B 3.6.2.5 Residual Heat Removal (RHR) Drywell Spray

BASES

BACKGROUND

Drywell Spray is a mode of the RHR system which may be initiated under post accident conditions to reduce the temperature and pressure of the primary containment atmosphere. The Drywell Spray function is credited in design basis analyses to limit peak drywell temperature following a steam line break inside of the Drywell and may be used to mitigate other loss of coolant accidents inside of the Drywell. This function is provided by two redundant Drywell Spray subsystems. The purpose of this LCO is to ensure that both subsystems are OPERABLE in applicable MODES.

Delete and replace with Insert 3.6.2.5 A

~~The RHR System has two loops with each loop consisting of two motor driven pumps, two heat exchangers, and associated piping and valves. There are two RHR Drywell spray subsystems per RHR System loop. The four RHR drywell spray subsystems are manually, initiated and independently controlled. The four RHR drywell spray subsystems perform the drywell spray function by circulating water from the suppression pool through the RHR heat exchangers and discharging the cooled suppression pool water into the drywell air space through the drywell spray sparger and spray nozzles. The spray then effects a temperature and pressure reduction through the combined effects of evaporative and convective cooling, depending on the drywell atmosphere. If the atmosphere is superheated, a rapid evaporative cooling process will ensue. If the environment in the drywell is saturated, temperature and pressure will be reduced via a convective cooling process.~~

~~Each drywell spray sparger line is common to the two RHR drywell spray subsystems in an RHR System loop. If required, a small portion of the spray flow can be directed to the suppression pool spray sparger and spray nozzles. High Pressure Service Water, circulating through the tube side of the heat exchangers, exchanges heat with the suppression pool water on the shell side of the heat exchangers and discharges this heat to the external heat sink.~~

(continued)

BASES (continued)

APPLICABLE ANALYSES

Reference 2 contains the results of analyses used to predict primary containment pressure and temperature response following a spectrum of small steam line break sizes. Steam line breaks are the most limiting events for drywell temperature response, since steam has higher energy content than liquid. These analyses, with primary focus on the drywell temperature response, take credit for containment sprays and structural heat sinks in the drywell and the suppression pool airspace. These analyses demonstrate that, with credit for containment spray (drywell and suppression pool), drywell temperature is maintained within limits for Environmental Qualification (EQ) of equipment located in the drywell for the analyzed spectrum of small steam line breaks. The RHR Drywell Spray System satisfies Criterion 3 of the NRC Policy Statement.

SAFETY

LCO

~~In the event of a small steam line break in the drywell, a minimum of one RHR drywell spray subsystem is credited in design analyses to mitigate the rise in drywell temperature and pressure caused by the steam line break, and to maintain the primary containment peak temperature and pressure below the design limits (Ref. 2). To ensure that these requirements are met, two RHR drywell spray subsystems (one in each loop) must be OPERABLE with power from two safety related independent power supplies. (The two subsystems must be in separate loops since the drywell spray sparger line valves are common to both subsystems in a loop.) Therefore, in the event of an accident, at least one subsystem is OPERABLE assuming the worst case single active failure. An RHR drywell spray subsystem is OPERABLE when one of the pumps, the associated heat exchanger, a HPSW System pump capable of providing cooling to the heat exchanger and associated piping, valves, instrumentation, and controls are OPERABLE.~~

Delete and replace with Insert 3.6.2.5 B

APPLICABILITY

In MODES 1, 2, and 3, a steam line break in the drywell could cause a rise in primary containment temperature and pressure. In MODES 4 and 5, the probability and consequences of steam line breaks are reduced due to the pressure and temperature limitations in these MODES. Therefore, maintaining RHR drywell spray subsystems OPERABLE is not required in MODE 4 or 5.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.6.2.5.1

Verifying the correct alignment for manual, power operated, and automatic valves in the RHR drywell spray mode flow path provides assurance that the proper flow paths will exist for system operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position provided it can be aligned to the accident position within the time assumed in the accident analysis. This is acceptable since the RHR drywell mode is manually initiated. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.5.2

This Surveillance is performed to verify that the spray nozzles are not obstructed and that flow will be provided when required. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.5.3

Verification of manual transfer between the normal and alternate power source (4kV emergency bus) for each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve demonstrates that AC power will be available to operate the required valves following loss of power to any single 4kV emergency bus. The ability to provide power to each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve from either of two independent 4kV emergency buses ensures that a single failure of a DG will not result in failure of the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve; therefore, failure of the manual transfer capability will result in inoperability of the associated RHR Drywell Spray subsystem. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. UFSAR, Sections 5.2 and 14.6.3.
2. ~~GE-NE-0000-0011-4483, Project Task Report, Peach Bottom Atomic Power Station, Units 2 and 3, SIL 636 Evaluation.~~ NEDC-33566P - Safety Analysis Report for Exelon Peach Bottom Station, Units 2 and 3, Constant Pressure Power Uprate.

INSERT 3.6.2.5 A

Each of the RHR drywell spray subsystems contains two motor driven pumps, two heat exchangers and a heat exchanger cross-tie line, which are manually initiated and independently controlled. The two RHR drywell spray subsystems perform the drywell spray function by circulating water from the suppression pool through the RHR heat exchangers and discharging the cooled suppression pool water into the drywell air space through the drywell spray sparger and spray nozzles. The spray then effects a temperature and pressure reduction through the combined effects of evaporative and convective cooling, depending on the drywell atmosphere. If the atmosphere is superheated, a rapid evaporative cooling process will ensue. If the environment in the drywell is saturated, temperature and pressure will be reduced via a convective cooling process.

Each drywell spray sparger line is supplied by one independent RHR drywell spray subsystem. If required, a small portion of the spray flow can be directed to the suppression pool spray sparger and spray nozzles. High Pressure Service Water, circulating through the tube side of the heat exchangers, exchanges heat with the suppression pool water on the shell side of the heat exchangers and discharges this heat to the external heat sink.

Each drywell spray subsystem is equipped with a RHR heat exchanger cross-tie line, located downstream of each RHR pump discharge and upstream of each heat exchanger inlet, which allows one RHR pump to be aligned to supply both RHR heat exchangers in the same subsystem to provide additional containment heat removal capability when only one RHR pump is available. The RHR heat exchanger cross-tie is normally closed, and is assumed in the design basis analyses to be placed in service one hour following a design basis accident or transient when insufficient electric power is available to operate two RHR pumps in a subsystem.

INSERT 3.6.2.5 B

In the event of a small steam line break in the drywell, a minimum of one RHR drywell spray subsystem is credited in the design analyses to mitigate the rise in drywell temperature and pressure caused by the steam line break, and to maintain the primary containment peak temperature and pressure below the design limits (Ref. 2). To ensure that these requirements are met, two RHR drywell spray subsystems (one in each loop) must be OPERABLE with power from two safety related independent power supplies. Therefore, in the event of an accident, at least one subsystem is OPERABLE assuming the worst case single active failure. An RHR drywell spray subsystem is OPERABLE when one of the pumps, two heat exchangers in the same subsystem, the associated RHR heat exchanger cross-tie line, two HPSW System pumps capable of providing cooling to the two heat exchangers and associated piping, valves, instrumentation, and controls are OPERABLE.

BASES

SURVEILLANCE REQUIREMENTS

~~SR 3.1.7.7 (continued)~~

~~cooldown in the normal manner. The required quantity contains an additional amount of B-10 equal to 25% of the minimum required amount of B-10 necessary to shutdown the reactor, to account for potential leakage and imperfect mixing. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.~~

SR 3.1.7.8

49.1

Demonstrating that each SLC System pump develops a flow rate ≥ ~~43.0~~ gpm at a discharge pressure ≥ 1275 psig ensures that pump performance has not degraded below design values during the fuel cycle. ~~This test~~ is indicative of overall performance. Such inservice inspections confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance. ~~In addition, the test results for each pump are used to determine that the limits of Table 3.1.7-1 are satisfied for each SLC subsystem.~~ The Frequency of this Surveillance is in accordance with the Inservice Testing Program.

This minimum pump flow rate requirement ensures that, when combined with the sodium pentaborate solution concentration requirements, the rate of negative reactivity insertion from the SLC System will adequately compensate for the positive reactivity effects encountered during power reduction, cooldown of the moderator, and xenon decay. The rate of negative reactivity insertion is increased by using highly enriched boron in the SLC System solution that increases the rate of Boron-10 injection and functions to shutdown the reactor core faster. This limits the heat generated that is transferred to the suppression pool during an ATWS event. Limiting the heat transferred to the suppression pool maintains the pool below design limits, which ensures adequate NPSH is available for the ECCS pumps without credit for containment accident pressure. This test confirms one point on the pump design curve and

SR 3.1.7.9

This Surveillance ensures that there is a functioning flow path from the boron solution storage tank to the RPV, including the firing of an explosive valve. The replacement charge for the explosive valve shall be from the same manufactured batch as the one fired or from another batch that has been certified by having one of that batch successfully fired. The Surveillance may be performed in separate steps to prevent injecting boron into the RPV. An acceptable method for verifying flow from the pump to the RPV is to pump demineralized water from a test tank through one SLC subsystem and into the RPV. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

The overpressure protection system must accommodate the most severe pressurization transient. Evaluations have determined that the most severe transient is the closure of all main steam isolation valves (MSIVs), followed by reactor scram on high neutron flux (i.e., failure of the direct scram associated with MSIV position) (Ref. 1). For the purpose of the analyses, ~~12~~ 13 SRVs and SVs are assumed to operate in the safety mode. The analysis results demonstrate that the design SRV and SV capacity is capable of maintaining reactor pressure below the ASME Code limit of 110% of vessel design pressure (110% x 1250 psig = 1375 psig). This LCO helps to ensure that the acceptance limit of 1375 psig is met during the Design Basis Event.

From an overpressure standpoint, the design basis events are bounded by the MSIV closure with flux scram event described above. Reference 2 discusses additional events that are expected to actuate the SRVs and SVs. Although not a design basis event, the ATWS analysis demonstrates that peak vessel bottom pressure is less than the ASME Service Level C limit of 1,500 psig.

SRVs and SVs satisfy Criterion 3 of the NRC Policy Statement.

LCO

The safety function of any combination of ~~12~~ 13 SRVs and SVs are required to be OPERABLE to satisfy the assumptions of the safety analysis (Refs. 1 and 2). Regarding the SRVs, the requirements of this LCO are applicable only to their capability to mechanically open to relieve excess pressure when the lift setpoint is exceeded (safety mode).

The SRV and SV setpoints are established to ensure that the ASME Code limit on peak reactor pressure is satisfied. The ASME Code specifications require the lowest safety valve setpoint to be at or below vessel design pressure (1250 psig) and the highest safety valve to be set so that the total accumulated pressure does not exceed 110% of the design pressure for overpressurization conditions. The transient evaluations in the UFSAR are based on these setpoints, but also include the additional uncertainties of + 3% of the nominal setpoint to provide an added degree of conservatism.

Operation with fewer valves OPERABLE than specified, or with setpoints outside the ASME limits, could result in a more severe reactor response to a transient than predicted, possibly resulting in the ASME Code limit on reactor pressure being exceeded.

(continued)

B 3.6 CONTAINMENT SYSTEMS

B 3.6.2.5 Residual Heat Removal (RHR) Drywell Spray

BASES

BACKGROUND

Drywell Spray is a mode of the RHR system which may be initiated under post accident conditions to reduce the temperature and pressure of the primary containment atmosphere. The Drywell Spray function is credited in design basis analyses to limit peak drywell temperature following a steam line break inside of the Drywell and may be used to mitigate other loss of coolant accidents inside of the Drywell. This function is provided by two redundant Drywell Spray subsystems. The purpose of this LCO is to ensure that both subsystems are OPERABLE in applicable MODES.

Delete and replace with Insert 3.6.2.5 A

~~The RHR System has two loops with each loop consisting of two motor driven pumps, two heat exchangers, and associated piping and valves. There are two RHR Drywell spray subsystems per RHR System loop. The four RHR drywell spray subsystems are manually, initiated and independently controlled. The four RHR drywell spray subsystems perform the drywell spray function by circulating water from the suppression pool through the RHR heat exchangers and discharging the cooled suppression pool water into the drywell air space through the drywell spray sparger and spray nozzles. The spray then effects a temperature and pressure reduction through the combined effects of evaporative and convective cooling, depending on the drywell atmosphere. If the atmosphere is superheated, a rapid evaporative cooling process will ensue. If the environment in the drywell is saturated, temperature and pressure will be reduced via a convective cooling process.~~

~~Each drywell spray sparger line is common to the two RHR drywell spray subsystems in an RHR System loop. If required, a small portion of the spray flow can be directed to the suppression pool spray sparger and spray nozzles. High Pressure Service Water, circulating through the tube side of the heat exchangers, exchanges heat with the suppression pool water on the shell side of the heat exchangers and discharges this heat to the external heat sink.~~

(continued)

BASES (continued)

APPLICABLE ANALYSES

Reference 2 contains the results of analyses used to SAFETY predict primary containment pressure and temperature response following a spectrum of small steam line break sizes. Steam line breaks are the most limiting events for drywell temperature response, since steam has higher energy content than liquid. These analyses, with primary focus on the drywell temperature response, take credit for containment sprays and structural heat sinks in the drywell and the suppression pool airspace. These analyses demonstrate that, with credit for containment spray (drywell and suppression pool), drywell temperature is maintained within limits for Environmental Qualification (EQ) of equipment located in the drywell for the analyzed spectrum of small steam line breaks. The RHR Drywell Spray System satisfies Criterion 3 of the NRC Policy Statement.

LCO

~~In the event of a small steam line break in the drywell, a minimum of one RHR drywell spray subsystem is credited in design analyses to mitigate the rise in drywell temperature and pressure caused by the steam line break, and to maintain the primary containment peak temperature and pressure below the design limits (Ref. 2). To ensure that these requirements are met, two RHR drywell spray subsystems (one in each loop) must be OPERABLE with power from two safety related independent power supplies. (The two subsystems must be in separate loops since the drywell spray sparger line valves are common to both subsystems in a loop.) Therefore, in the event of an accident, at least one subsystem is OPERABLE assuming the worst case single active failure. An RHR drywell spray subsystem is OPERABLE when one of the pumps, the associated heat exchanger, a HPSW System pump capable of providing cooling to the heat exchanger and associated piping, valves, instrumentation, and controls are OPERABLE.~~

Delete and replace with Insert 3.6.2.5 B

APPLICABILITY

In MODES 1, 2, and 3, a steam line break in the drywell could cause a rise in primary containment temperature and pressure. In MODES 4 and 5, the probability and consequences of steam line breaks are reduced due to the pressure and temperature limitations in these MODES. Therefore, maintaining RHR drywell spray subsystems OPERABLE is not required in MODE 4 or 5.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.6.2.5.1

Verifying the correct alignment for manual, power operated, and automatic valves in the RHR drywell spray mode flow path provides assurance that the proper flow paths will exist for system operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position provided it can be aligned to the accident position within the time assumed in the accident analysis. This is acceptable since the RHR drywell mode is manually initiated. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.5.2

This Surveillance is performed to verify that the spray nozzles are not obstructed and that flow will be provided when required. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.5.3

Verification of manual transfer between the normal and alternate power source (4kV emergency bus) for each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve demonstrates that AC power will be available to operate the required valves following loss of power to any single 4kV emergency bus. The ability to provide power to each RHR motor-operated flow control valve and each RHR cross-tie motor-operated valve from either of two independent 4kV emergency buses ensures that a single failure of a DG will not result in failure of the RHR motor-operated flow control valve and the RHR cross-tie motor-operated valve; therefore, failure of the manual transfer capability will result in inoperability of the associated RHR Drywell Spray subsystem. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. UFSAR, Sections 5.2 and 14.6.3.
2. ~~GE-NE-0000-0011-4483, Project Task Report, Peach Bottom Atomic Power Station, Units 2 and 3, SIL 636 Evaluation.~~

NEDC-33566P - Safety Analysis Report for Exelon Peach Bottom Station, Units 2 and 3, Constant Pressure Power Uprate.

INSERT 3.6.2.5 A

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Each of the RHR drywell spray subsystems contains two motor driven pumps, two heat exchangers and a heat exchanger cross-tie line, which are manually initiated and independently controlled. The two RHR drywell spray subsystems perform the drywell spray function by circulating water from the suppression pool through the RHR heat exchangers and discharging the cooled suppression pool water into the drywell air space through the drywell spray sparger and spray nozzles. The spray then effects a temperature and pressure reduction through the combined effects of evaporative and convective cooling, depending on the drywell atmosphere. If the atmosphere is superheated, a rapid evaporative cooling process will ensue. If the environment in the drywell is saturated, temperature and pressure will be reduced via a convective cooling process.

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Each drywell spray sparger line is supplied by one independent RHR drywell spray subsystem. If required, a small portion of the spray flow can be directed to the suppression pool spray sparger and spray nozzles. High Pressure Service Water, circulating through the tube side of the heat exchangers, exchanges heat with the suppression pool water on the shell side of the heat exchangers and discharges this heat to the external heat sink.

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Each drywell spray subsystem is equipped with a RHR heat exchanger cross-tie line, located downstream of each RHR pump discharge and upstream of each heat exchanger inlet, which allows one RHR pump to be aligned to supply both RHR heat exchangers in the same subsystem to provide additional containment heat removal capability when only one RHR pump is available. The RHR heat exchanger cross-tie is normally closed, and is assumed in the design basis analyses to be placed in service one hour following a design basis accident or transient when insufficient electric power is available to operate two RHR pumps in a subsystem.

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INSERT 3.6.2.5 B

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In the event of a small steam line break in the drywell, a minimum of one RHR drywell spray subsystem is credited in the design analyses to mitigate the rise in drywell temperature and pressure caused by the steam line break, and to maintain the primary containment peak temperature and pressure below the design limits (Ref. 2). To ensure that these requirements are met, two RHR drywell spray subsystems (one in each loop) must be OPERABLE with power from two safety related independent power supplies. Therefore, in the event of an accident, at least one subsystem is OPERABLE assuming the worst case single active failure. An RHR drywell spray subsystem is OPERABLE when one of the pumps, two heat exchangers in the same subsystem, the associated RHR heat exchanger cross-tie line, two HPSW System pumps capable of providing cooling to the two heat exchangers and associated piping, valves, instrumentation, and controls are OPERABLE.