Exelon Generation®

200 Exelon Way
Kennett Square, PA 19348
www.exeloncorp.com

10 CFR 50.90

May 19, 2017

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Peach Bottom Atomic Power Station, Unit 2
Renewed Facility Operating License No. DPR-44
NRC Docket No. 50-277

Subject: License Amendment Request –Revise Technical Specifications Section 3.4.3 (SRVs/SVs) for the Remainder of the Current Operating Cycle for Unit 2

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC (Exelon), proposes a change to the Technical Specifications (TS), Appendix A of Renewed Facility Operating License No. DPR-44 for Peach Bottom Atomic Power Station (PBAPS), Unit 2.

The proposed amendment would revise TS Section 3.4.3. "Safety Relief Valves (SRVs) and Safety Valves (SVs), " to decrease the required number of Safety Relief Valves (SRVs) and Safety Valves (SVs) when operating at a power level of less than or equal to 3358 MWt (approximately 85% Current Licensed Thermal Power). This change would be in effect for the current PBAPS Unit 2 Cycle 22 that is scheduled to end in October 2018.

Exelon requests approval of the proposed amendment under an expedited NRC review. While the current plant conditions do not meet the criteria for an emergency situation or an exigent circumstance of 10 CFR 50.91(a)(5) and (a)(6), the inoperability of another SRV or an SV would require commencement of a 12-hour reactor shutdown. Expedited NRC review of this proposed amendment could avoid an unnecessary reactor shutdown and avoid the reactivity control challenges that can occur during startup from a Hot Shutdown condition following a short shutdown. Exelon requests approval of the proposed amendment within 6 months of the date of this letter. Upon NRC approval, the amendment shall be implemented within 5 days of issuance.

Exelon has concluded that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92, "Issuance of amendment."

The proposed change has been reviewed by the PBAPS Plant Operations Review Committee in accordance with the requirements of the Exelon Quality Assurance Program.

This amendment request contains no regulatory commitments.

Attachment 1 provides the evaluation of the proposed change. Attachment 2 provides a copy of the marked-up TS page that reflects the proposed change. Attachment 3 provides a copy of the marked-up TS Bases pages that reflect the proposed change (for information only).

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

Should you have any questions concerning this submittal, please contact David Neff at 610-765-5631.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 19th day of May 2017.

Respectfully,

D. P. Helker

David P. Helker
Manager, Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Attachments:
1. Evaluation of Proposed Change
2. Markup of Proposed Technical Specifications Page
3. Markup of Proposed Technical Specifications Bases Pages (For Information Only)

cc:	Regional Administrator - NRC Region I	w/ attachments
	NRC Senior Resident Inspector - PBAPS	"
	NRC Project Manager, NRR - PBAPS	"
	R.R. Janati, Pennsylvania Bureau of Radiation Protection	"
	S.T. Gray, State of Maryland	"

ATTACHMENT 1

License Amendment Request

Peach Bottom Atomic Power Station, Unit 2

Docket No. 50-277

EVALUATION OF PROPOSED CHANGE

Subject: **License Amendment Request to Revise Technical Specifications Section 3.4.3 for the Remainder of the Current Operating Cycle for Unit 2**

1.0 SUMMARY DESCRIPTION

Pursuant to 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC (Exelon), proposes a change to the Technical Specifications (TS), Appendix A of Renewed Facility Operating License No. DPR-44 for Peach Bottom Atomic Power Station (PBAPS), Unit 2.

The proposed amendment would revise TS Section 3.4.3 to decrease the required number of Safety Relief Valves (SRVs) and Safety Valves (SVs) from 13 to 12 with reactor thermal power less than or equal to 3358 MWt. A note is proposed to be added to the Limiting Condition for Operation (LCO) of TS Section 3.4.3, “Safety Relief Valves (SRVs) and Safety Valves (SVs),” that would be effective for the remainder of the current PBAPS Unit 2 operating cycle (i.e., Cycle 22) that is scheduled to end in October 2018.

2.0 DETAILED DESCRIPTION

Overpressure protection of the reactor pressure vessel (RPV) at PBAPS is provided by 11 SRVs and three SVs located on the main steam lines between the reactor vessel and the first isolation valve within the drywell. The SRVs can actuate by either an overpressure condition (above the SRV setpoint) or by remote operation. Along with overpressure protection, five SRVs are part of the Automatic Depressurization System (ADS) designed within the Emergency Core Cooling System (ECCS) which is governed by TS Section 3.5.1, Emergency Core Cooling System – Operating. In the ADS function, the five SRVs are used to depressurize the nuclear system to allow the low pressure coolant injection systems to function. The SRVs discharge to the suppression pool. The spring-loaded SVs actuate during an overpressure condition and discharge to the drywell. TS Section 3.4.3 currently requires 13 of the 14 SRVs/SVs, in any combination, to be operable during Modes 1, 2, and 3.

The proposed amendment would revise TS Section 3.4.3 to decrease the required number of Safety Relief Valves (SRVs) and Safety Valves (SVs) under reduced reactor thermal power operation of 3358 MWt. During the current PBAPS Unit 2 cycle of operation, the 2K SRV, one of the 11 SRVs, became inoperable. The other ten SRVs and three SVs remain operable, but a second inoperable valve will require a plant shutdown in 12 hours in accordance with TS Section 3.4.3, Required Action A.1. The Technical Evaluation section below provides an evaluation showing that 12 SRVs and SVs provide sufficient safety function capability, with margin, for operation at or below 3358 MWt and that a reactor shutdown is not necessary. This proposed change would allow for a power reduction to less than or equal to 3358 MWt and initiation of repairs without requiring a reactor shutdown. The inspection of the 2K SRV from within the Primary Containment can be initiated with a Primary Containment entry at approximately 5% Rated Thermal Power (RTP). This change would also allow for a power ascension following a pressure switch repair that would avoid the reactivity control challenges that can occur during startup from Hot Shutdown. This change would be in effect for the remainder of the current PBAPS Unit 2 Cycle 22 which is scheduled to end in October 2018. This change could be used more than once during PBAPS Unit 2 Cycle 22 provided that there is not a potential common mode failure concern with the operable SRVs or SVs.

The proposed change includes the following TS revision:

TS Section 3.4.3, "Safety Relief Valves (SRVs) and Safety Valves (SVs)," Limiting Condition for Operation (LCO) 3.4.3 – This LCO is being revised to add a note to modify the LCO. The note states the following:

> The safety function of 12 valves (any combination of SRVs and SVs) are required to be OPERABLE $\leq$3358 MWt during operating cycle 22.

Exelon is requesting approval of the proposed amendment under an expedited NRC review. While the current plant conditions do not meet the criteria for an emergency situation or an exigent circumstance of 10 CFR 50.91(a)(5) and (a)(6), the inoperability of another SRV or an SV would require commencement of a 12-hour reactor shutdown. Expedited NRC review of this proposed amendment could avoid an unnecessary reactor shutdown and avoid the reactivity control challenges that can occur during startup from a Hot Shutdown condition following a short shutdown.

Attachment 2 provides the existing TS page marked-up to show the proposed change. Marked-up TS Bases are provided in Attachment 3 for information only. The TS Bases change will be processed in accordance with the PBAPS, Unit 2 TS Bases Control Program (TS 5.5.10).

3.0 TECHNICAL EVALUATION

The proposed amendment would revise TS Section 3.4.3 to decrease the required number of Safety Relief Valves (SRVs) and Safety Valves (SVs) when operating at a power level of less than or equal to 3358 MWt. A note is proposed to be added to the Limiting Condition for Operation (LCO) of TS Section 3.4.3, “Safety Relief Valves (SRVs) and Safety Valves (SVs),” that would be effective for the remainder of the current PBAPS Unit 2 Cycle 22.

Reactor Vessel Overprotection Equipment Description

The Nuclear Boiler System (NBS) transports the steam generated in the RPV through the primary containment by means of a piping system (consisting of four 26-inch main steam lines with two pneumatically operated, globe type isolation valves in each steam line) from the RPV nozzles to the outboard Main Steam Isolation Valves (MSIVs). Between the RPV and the MSIVs, three safety valves (SVs) and 11 dual function safety relief valves (SRVs) are mounted on the steam lines which, in conjunction with reactor scram, assist in limiting peak pressure in the primary system during plant transient conditions. The design pressure of the reactor vessel and Reactor Coolant Pressure Boundary (RCPB) is 1250 psig. The acceptance limit for pressurization events is the ASME code allowable peak pressure of 1,375 psig (110% of design value). The SVs and SRVs of the NBS are designed to meet the requirements for reactor vessel overpressure protection to conform to ASME Boiler and Pressure Vessel Code (B&PVC), Section III, Article 9. The nuclear system pressure relief system is designed with 11 SRVs with opening setpoints of 1,135 psig, 1,145 psig, and 1,155 psig, and 3 SVs with opening setpoints of 1,260 psig.

The SRVs are Target Rock three-stage pilot operated safety/relief valves. The SVs are Dresser spring loaded safety valves. The SRVs and SVs are located on the main steam lines between the reactor vessel and the first isolation valve within the drywell. The SRVs can actuate by either of two modes: the safety mode or the depressurization mode. In the safety mode, the pilot disc

opens when steam pressure at the valve inlet expands the bellows to the extent that the hydraulic seating force on the pilot disc is reduced to zero. Opening of the pilot stage allows a pressure differential to develop across the second stage disc which opens the second stage disc, thus venting the chamber over the main valve piston. This causes a pressure differential across the main valve piston which opens the main valve. The SVs are spring loaded valves that actuate when steam pressure at the inlet overcomes the spring force holding the valve disc closed. This satisfies the ASME Code requirement.

Each of the 11 SRVs discharge steam through a discharge line to a point below the minimum water level in the suppression pool. The three SVs discharge steam directly to the drywell. In the depressurization mode, each SRV is opened by a pneumatic actuator which opens the second stage disc. The main valve then opens as described above for the safety mode. The depressurization mode is initiated either manually by the operator or automatically by the ADS. Unlike the safety mode, the depressurization mode does not rely on the pilot stage and is independent of the bellows. The depressurization mode provides a method for depressurization of the reactor coolant pressure boundary. All 11 of the SRVs function in the safety mode and have the capability to operate in the depressurization mode via manual actuation. Five of the SRVs are allocated to the ADS.

The pressure relief system prevents over pressurization of the nuclear system during Anticipated Operational Occurrence transient events (AOOs), the plant ASME upset overpressure protection event, and postulated Anticipated Transient Without Scram (ATWS) events. The SRVs and SVs, along with other functions, provide this protection.

Overpressure Protection Function During Power Operation (Limiting AOO Event)

For PBAPS, the limiting overpressure AOO event is the main steam isolation valve closure with scram on high flux (MSIVF). The case of MSIVF is analyzed during every cycle-specific reload and was re-evaluated at Extended Power Uprate (EPU) conditions to assure that the ASME code allowable value for peak vessel pressure is not violated. The EPU analysis conservatively assumed that the MSIV position scram fails and the event terminates on a high neutron flux scram signal. The closure of all MSIVs causes a rapid pressure increase in the reactor vessel. The pressure increase is mitigated by the actuation of the SRVs and SVs. The Maximum Extended Load Line Limit Analysis-Plus (MELLLA+) Amendment No. 305 and the PB Unit 2 Cycle 22 Reload Analysis confirmed that the MSIVF event at Current Licensed Thermal Power (CLTP, 3951 MWt) remains the limiting overpressure event.

The MSIVF event was analyzed for PBAPS Unit 2 Cycle 22 at CLTP conditions with the SRV/SV configuration at a +3% tolerance setting and with one relief valve out-of-service (one SRVOOS). The MSIVF event was analyzed at both minimum (83% of rated) and maximum (110% of rated) core flow and normal feedwater temperature, which are the bounding conditions for reactor vessel overpressure calculations. The peak bottom pressure for PBAPS Unit 2 Cycle 22 is 1,349 psig which is below the ASME overpressure ASME upset code limit of 1,375 psig by a margin of 26 psi. The peak dome pressure reached is 1,321 psig, with 4 psi margin to the TS Safety Limit of 1,325 psig.

Overpressure Protection Function During Anticipated Transients without Scram (Limiting Special Event)

The PBAPS ATWS evaluation considered the limiting cases for RPV overpressure and for suppression pool temperature / containment pressure and are analyzed under two cases: (1) Main Steam Isolation Valve Closure (MSIVC) and (2) Pressure Regulator Failure Open (PRFO). For PBAPS, a Loss of Offsite Power (LOOP) does not result in a reduction in the Residual Heat Removal (RHR) suppression pool cooling capability relative to these cases. Thus, with the same RHR suppression pool cooling capability, the containment responses for the MSIVC and PRFO cases bound the LOOP case. The plant-specific ATWS overpressure analysis at MELLLA+ conditions was performed using the approved TRACG overpressure methodology. The current licensing basis limiting ATWS event for the peak reactor vessel pressure response is MSIVC event at Beginning of Cycle (BOC) at the MELLLA+ operating point of 100% RTP and 83% rated core flow. The MSIVC event was analyzed with the SRV/SV configuration at a +3% tolerance setting and with one relief valve out-of-service. The peak bottom pressure for the MELLLA+ limiting condition is 1,419 psig which is below the ASME Service Level C limit of 1,500 psig by a margin of 81 psi.

Depressurization Mode Function During Loss of Coolant Accidents

The depressurization mode is initiated either manually by the operator or automatically by the ADS. Unlike the safety mode, the depressurization mode does not rely on the pilot stage and is independent of the bellows. The ADS actuates five NBS SRVs which depressurize the RPV following plant events, so that injection flow to the reactor vessel from the RHR System Low Pressure Coolant Injection (LPCI) mode of operation and/or the Core Spray (CS) System can occur in adequate time to cool the core and limit excessive fuel temperatures. The ADS function is governed by TS Section 3.5.1, Emergency Core Cooling System – Operating, and is separate from the overpressure protection function governed by TS Section 3.4.3. During an ADS actuation, the pneumatic actuator opens the corresponding ADS SRV to depressurize the RPV during startup, planned operation, shutdown, and following design basis events. The 2A, 2B, 2C, 2G and 2K SRVs have the ADS function.

Evaluation Supporting Reduced Power Operations With an Additional SRVOOS

An evaluation was performed of the impact of an additional SRVOOS on the limiting overpressure event for PBAPS Unit 2 during Cycle 22. This evaluation was then used to determine the reduced reactor power level that would conservatively offset the impacts/effects of operation with up to two SRVOOS. A discussion of the evaluation performed and the results are provided below.

Description of Overpressure Event

The limiting overpressure event during PBAPS Unit 2 Cycle 22 is the MSIVF event. The results of the analysis are provided in LAR Figure 1, which is from Figure 29 and Section 12 of the Supplemental Reload Licensing Report (SRLR) for Unit 2 Cycle 22, (P2R21C22, current operating cycle SRLR). The analysis assumes one of the 11 SRVs is out-of-service with three operable SVs. During this event, the reduction in steam flow out of the reactor vessel, as the MSIVs close, results in an increase in reactor pressure. As pressure increases, core voids collapse and reactor power increases, and a reactor scram is quickly initiated due to high

neutron flux at about 2.0 seconds. As the event proceeds, the core fuel heat flux rises and eventually reaches about 118% at about 3.0 seconds. Reactor pressure increases rapidly until the SRV lift setpoints are reached – the SRVs begin to open between about 2.7 to 2.9 seconds. After the SRVs have lifted, the reactor pressure continues to increase, but at a slower rate, until the SVs lift at about 3.8 seconds. The SV lift rapidly reduces the pressurization rate. Reactor pressure peaks at about 4.0 seconds and then begins to decrease as the total SRV and SV relief capacity exceeds the core steam generation rate. At this point in the sequence, the critical portions of the event analysis are essentially over. The analysis shows that about half of the capacity of the SVs is used. Maximum reactor steam dome pressure obtained is 1,321 psig, which is below the TS Safety Limit of 1,325 psig.

Allowable Power Level with One Additional SRVOOS

In order to justify Unit 2 Cycle 22 operation with an additional SRVOOS, a compensatory reduction in the initial steam generation rate (i.e., a reduction in reactor power) is required to offset the reduction in steam relief capacity.

To determine the maximum power level allowable with two SRVOOS, a sufficient reduction in the initial steam generation rate to offset the reduction in steam relief capacity must be determined. The steam relief capacity of the PBAPS SRVs and SVs is provided in the UFSAR, Table 4.4.1 and Appendix K.VI. The 11 SRVs each have an ASME certified capacity of 800,000 lbm/hr at 1,080 psig and the three SVs each have an ASME certified capacity of 925,700 lbm/hr at 1,230 psig.

As identified in UFSAR, Appendix K.VI, Section 6.0, there is a linear relationship between relief valve inlet pressure and relief valve steam flow. As identified in Section 12 of the P2R21C22 SRLR, the peak reactor steam dome pressure for the limiting pressurization event (MSIVF) is about 1,320 psig. This results in the following estimated capacities for the SRVs and SVs:

Table 1

	Pressure (psig)	Capacity per Valve (lbm/hr)	Total Capacity (Mlbm/hr)	Valve Capacity *	Total Capacity *
SRVs (10)	1320	977,800	9.78	6.05%	60.5%
SVs (3)	1320	993,400	2.98	6.14%	18.4%
Total					78.9%

*Percent of rated steam flow of 16.17 Mlbm/hr from UFSAR Section 4.2.

Similarly, the peak reactor steam dome pressure during the ATWS event increases to approximately 1430 psig (based on 101.66% CLTP conditions). The analysis used for the ATWS event is based on a starting power level of 101.66% CLTP to add conservatism to the analysis. This is the power level being requested in the Measurement Uncertainty Recapture (MUR) Uprate license amendment request submitted for PBAPS on February 17, 2017. This results in the following estimated capacities for the SRVs and SVs:

Table 2

	Pressure (psig)	Capacity per Valve (lbm/hr)	Total Capacity (Mlbm/hr)	Valve Capacity *	Total Capacity *
SRVs (10)	1430	1,059,300	10.59	6.55%	65.5%
SVs (3)	1430	1,076,200	3.23	6.66%	20.0%
Total					85.5%

*Percent of rated steam flow of 16.17 Mlbm/hr from UFSAR Section 4.2.

Based on the above, the relief capacity for a single valve is conservatively assumed to be 7% of rated steam flow for the purposes of this evaluation. This assumption will increase the amount of the power reduction necessary to ensure sufficient SVR/SV overpressure protection capacity is available.

To compensate for a reduction in relief valve capacity due to two SRVOOS, power level will be reduced, which results in a reduction of reactor pressure and steam flow. Steam flow is closely proportional to power level, so that a 10% reduction in power will result in slightly greater than a 10% reduction in steam flow.

The general trends and characteristics of an MSIVF event do not change significantly, if initiated at a somewhat reduced initial reactor power level. It is expected that the dynamic system response and results would be approximately proportional to the full power case. The critical core reactivity characteristics (i.e., void, Doppler, and scram coefficients) are a strong function of core burnup (e.g., End of Cycle exposure) and only a weak function of initial reactor power. Thus, the core fuel heat flux for the reduced power case would also reach about 118% of the initial power level and the integral power and steam generation over the first 4 seconds of the event would be approximately proportional to the full power case. This is illustrated, and corroborated, in the attached figures (LAR Figure 1 and LAR Figure 2). LAR Figure 1 provides the results of the ASME Overpressure analyses for PBAPS Unit 2 Cycle 22 at 3951 MWt. LAR Figure 2 provides the results of the ASME Overpressure analyses for PBAPS Unit 2 Cycle 20 at 3514 MWt. The response characteristics/parameters are presented as percent of initial value. The reactor neutron flux, thermal power, core flow and vessel steam flow responses are very similar (as are the underlying reactivity responses). Only the peak reactor pressure results are substantially different with the higher initial power Cycle 22 case peak pressure about 25 psi higher, as expected. This also results in the SVs lifting, which did not occur in the Cycle 20 case due to the lower peak reactor steam dome pressure. Based on this, it is reasonable to assume that the same proportion of available pressure relief system flow capacity to initial reactor steam flow for a reduced power case would result in about the same peak reactor pressure.

Conservatively assuming the capacity of one SRV is 7% of rated steam flow, and comparing this to the maximum total pressure relief system flow capacity reached during the full power event analysis for Unit 2 Cycle 22 (about 68%), it can be concluded that a power reduction of 10% to about 90% CLTP [(68-7)/68 = 0.897] of rated power with an additional SRVOOS (2 SRVOOS total) would result in about the same peak reactor pressure as the current Unit 2 Cycle 22 licensing basis results. This evaluation is conservative given that the SVs did not fully open in the current licensing basis analysis and additional pressure relief capacity is available.

The assumption of event proportionality to initial reactor power is reasonable but has some uncertainty due to small changes in key analysis parameters such as initial core void content, void coefficient of reactivity and power distribution. Given this, an additional margin is applied to the estimated power reduction. A conservative margin of 50% is applied to the calculated 10% power reduction, resulting in a required power reduction of 15% of 3951 MWt, resulting in a reactor thermal power limit of 3358 MWt with 2 SRVOOS. Because the limit is in terms of absolute thermal power, this change is not linked with the MUR Uprate license amendment request that is currently under NRC review.

Confirmatory Evaluation

To affirm the RPV overpressure evaluation presented above, an alternate evaluation approach was considered. The alternate approach is based on a comparison to actual PBAPS Unit 2 reload results performed with a total of 12 SRV/SV available. This evaluation is based on the results for the MSIVF (ASME Overpressure) event analysis performed for PBAPS Unit 2 Cycle 20 (2012-2014). Refer to LAR Figure 2, which is Figure 2 of the Revised Overpressure Analysis for PBAPS Unit 2 Cycle 20.

The PBAPS Unit 2 Cycle 20 MSIVF analysis was performed with a total of 10 SRVs and 2 SVs available (12 SRV/SV total), equivalent to the proposed license amendment request. The analysis was performed at the pre-EPU power level of 3514 MWt. The analysis calculated a peak reactor steam dome pressure of 1298 psig, 27 psi below the TS Safety Limit of 1,325 psig. The analysis power level of 3514 MWt is approximately 4.6% higher than the proposed reactor thermal power restriction of 3358 MWt determined above. Therefore, it is determined by alternate evaluation, based on a review of the MSIVF event analysis at a higher power level, that the proposed reactor thermal power limit of 3358 MWt with 2 SRVOOS provides conservative margin.

ATWS Mitigation (Peak Pressure & Suppression Pool Temperature)

The limiting ATWS case for peak reactor pressure is similar to the MSIVF event described in the Vessel Overpressure event discussed above, except that a complete failure to scram is assumed. As a result, peak reactor pressure reaches about 1,430 psig (at 101.66% CLTP conditions), which is 70 psi below the ASME Service Level C acceptance criterion of 1500 psig. After the initial power increase from MSIV closure, reactor power is reduced by the action of the ATWS Recirculation Pump Trip (RPT) and void and Doppler feedback. The maximum total pressure relief system flow capacity reached during the event is about 81% of MUR rated steam flow (16.48 Mlbm/hr – equivalent to about 82.5% of CLTP rated steam flow).

Similar to the evaluation performed for the evaluation of the MSIVF event above, the general trends and characteristics of an MSIV closure event with failure to scram do not change significantly if initiated at a somewhat reduced initial reactor power level. It is expected that the dynamic system response and results would be approximately proportional to the full power case.

Similar to the evaluation performed for the RPV overpressure event above, conservatively assuming the capacity of one SRV is 7% of CLTP rated steam flow, and comparing this to the maximum total pressure relief system flow capacity reached during the full power event analysis,

it can be concluded that a power reduction to about 91% ([82.5-7]/82.5 = 0.915] of rated power with an additional SRVOOS (2 SRVOOS total) would result in about the same peak reactor pressure as the current licensing basis results. This result is bounded by the reactor vessel overpressure results determined above. Therefore, the proposed reactor thermal power limit of 3358 MWt with 2 SRVOOS is applicable to the ATWS event.

The following areas were also assessed to determine if adding a second SRVOOS would have an adverse impact on the results of the current analysis.

- Thermal Limits MCPR
- ECCS/LOCA Performance
- High Pressure System Performance (HPCI, RCIC, SLC)

The assessment confirmed the existing analyses remained bounding for the condition of adding a second SRVOOS with a limited maximum operating power level of 3358 MWt.

Conclusion

A compensatory reduction in maximum allowed reactor power to 3358 MWt has been determined to conservatively offset the impact/effects of operation with an additional (up to 2) SRVs/SVs out-of–service (SRVOOS). Therefore, operation with 2 SRVOOS is supported at PBAPS Unit 2 for Cycle 22 utilizing this operational restriction. The operational restriction would also bound operation at MUR conditions if this mode of operation is implemented during Cycle 22. With the maximum thermal power limitation condition, the proposed change has no adverse effect on plant operation, or the availability or operation of any accident mitigation equipment. The plant response to the design basis accidents remains bounded by existing analyses. The proposed change does not require any new or unusual operator actions. The proposed change does not introduce any new failure modes that could result in a new accident. There is no change being made to safety analysis assumptions, safety limits or limiting safety system settings that would adversely affect plant safety as a result of the proposed change.

TS Bases Sections B 3.4.3

The TS Bases for the SRVs and SVs (TS Section 3.4.3) will be revised to describe expected actions if additional SRVs or SVs become inoperable during PBAPS Unit 2 Cycle 22 operations. The proposed change includes the following addition to the LCO Bases discussion:

If a second SRV or SV becomes inoperable leaving 12 operable SRVs/SVs and THERMAL POWER is above 3358 MWt, then Condition A must be entered. THERMAL POWER may be reduced to less than or equal to 3358 MWt within 12 hours from when the second SRV or SV became inoperable to exit Condition A. If repairs are made such that at least 13 SRVs/SVs are operable, then operations may resume at RTP.

If during PBAPS Unit 2 Cycle 22, a second and third SRV/SV become inoperable leaving 11 operable SRVs/SVs, then Condition A will require Unit 2 to be in Mode 3 within 12 hours from when one or more required SRV/SV became inoperable. If repairs are made such that 12 SRVs/SVs are operable, then operations may resume at 3358 MWt. If repairs are made such that at least 13 SRVs/SVs are operable, then operations may resume at RTP. The marked-up TS Bases pages that reflect the proposed change are provided in Attachment 3 for information purposes only.

2K SRV Operational Status During Current Cycle 22

The 2K SRV was declared inoperable on April 1, 2017, and remains inoperable as of the time of the submittal of this license amendment request, due to a concern that the valve may not be capable of performing its overpressure protection function. Investigation of the 2K SRV conditions concluded that either the bellows or the pressure switch circuit that monitors for bellows leakage is degraded. The bellows may have a steam leak into the enclosed pressure switch monitoring volume that could cause the 2K SRV's setpoint to drift higher. During the 2016 Unit 2 Refueling outage, degraded cabling for the 2K SRV pressure switch was replaced. During post maintenance testing, the pressure switch initially failed a functional test, but later repeatedly passed the functional test and the pressure switch and cabling were considered operable. The pressure switch provides an indication to the Main Control Room, has no control function and would not affect the 2K SRV ability to function. The 2K SRV is considered inoperable for the overpressure protection function (TS 3.4.3) until inspection reveals the actual SRV condition. This condition does not affect the ADS or manual depressurization mode functions of the 2K SRV. As of the time of the submittal of this license amendment request, the remaining ten SRVs are all operable and have not exhibited a similar symptom. Each SRV is replaced once every six years and the bellows tested during valve ASME Code certification process prior to installation. The 2K SRV was last tested in 2016. Each SRV pressure switch was last tested during the 2016 fall Refueling outage. The SVs do not utilize a bellows or pressure switch and hence could not be affected by a similar failure. Two SRVs, including the 2K SRV, and one SV were instrumented for vibration measurement during the Unit 2 EPU power ascension. Although higher than pre-EPU conditions, the vibration levels observed during the testing showed the three instrumented valves were less than 50% of the corresponding acceptance limits during ascension to full EPU power. There is no current information to conclude that the 2K SRV malfunction is related to the increase in Main Steam Line vibrations.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

As stated in Appendix H of the Peach Bottom Atomic Power Station (PBAPS) Updated Final Safety Analysis Report (UFSAR), the plant design was evaluated against the draft General Design Criteria proposed by the Atomic Energy Commission (AEC) in July 1967. It was concluded that the design of Units 2 and 3 conforms with the intent of the proposed criteria.

Relief and safety valves and the Reactor Protection System (RPS) provide overpressure protection for the RCPB during power operation. The regulatory acceptance criteria are based on: (1) draft GDC-9, insofar as it requires that the RCPB be designed and

constructed so as to have an exceedingly low probability of gross rupture or significant leakage throughout its design lifetime and (2) draft GDC-33 insofar as it requires the reactor coolant pressure boundary to be capable of accommodating static and dynamic loads resulting from an inadvertent and sudden release of energy to the coolant.

The overpressure protection system must accommodate the most severe pressurization transient. Each PBAPS Unit has 11 installed Safety Relief Valves (SRVs) and three Safety Valves (SVs) of which a total of 13 SRVs/SVs are required to be operable. 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 positions, or abbreviated as MSIVF). For the purpose of the analyses, a total of thirteen SRVs and SVs are assumed to operate in the safety mode (i.e., 1 SRV or SV out-of-service). The MSIVF event is conservatively analyzed assuming a failure of the MSIV position scram. 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 1,250 psig = 1,375 psig). The Technical Specifications (TS) Limiting Condition for Operating (LCO) for the SRVs and SVs helps to ensure that the acceptance limit of 1,375 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. Although not a design basis event, the Anticipated Transient Without Scram (ATWS) analysis demonstrates that peak vessel bottom pressure is less than the ASME Service Level C limit of 1,500 psig, which is the ATWS acceptance criterion for overpressure protection.

4.2 Precedence

An applicable precedent was not identified.

4.3 No Significant Hazards Consideration

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC (Exelon), proposes a change to the Technical Specifications (TS), Appendix A of the Renewed Facility Operating License No. DPR-44 for Peach Bottom Atomic Power Station (PBAPS), Unit 2.

The proposed amendment would revise TS Section 3.4.3 to decrease the required number of Safety Relief Valves (SRVs) and Safety Valves (SVs) from a total of 13 to 12, under reduced reactor thermal power operation of 3358 MWt (approximately 85% of Current Licensed Thermal Power (CLTP)). A note is proposed to be added to the Limiting Condition for Operation (LCO) of TS Section 3.4.3, "Safety Relief Valves (SRVs) and Safety Valves (SVs)," that would be effective during the current PBAPS Unit 2 operating cycle. Exelon has evaluated the proposed change, using the criteria in 10 CFR 50.92, "Issuance of amendment," and has determined that the proposed change does not involve a significant hazards consideration. The following information is provided to support a finding of no significant hazards consideration.

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

   Response: No

   The proposed change would revise TS Section 3.4.3 to decrease the required number of Safety Relief Valves (SRVs) and Safety Valves (SVs) from a total of 13 to 12, under reduced reactor thermal power operation of 3358 MWt (approximately 85% of Current Licensed Thermal Power (CLTP)). A compensatory reduction in maximum allowed reactor power to 3358 MWt has been determined to conservatively offset the impact/effects of operation with an additional (up to 2) SRVs/SVs Out-of-Service. The Reactor Pressure Vessel (RPV) overpressure protection capability of the 12 operable SRVs and SVs is adequate at the lower power level to ensure the ASME code allowable peak pressure limits are not exceeded. With the maximum thermal power limitation condition, the proposed change has no adverse effect on plant operation, or the availability or operation of any accident mitigation equipment. The plant response to the design basis accidents, Anticipated Operational Occurrence (AOO) events and Special Events remains bounded by existing analyses. The proposed change does not require any new or unusual operator actions. The proposed change does not introduce any new failure modes that could result in a new or different accident. The SRVs and SVs are not being modified or operated differently and will continue to operate to meet the design basis requirements for RPV overpressure protection. The proposed change does not alter the manner in which the RPV overpressure protection system is operated and functions and thus, there is no significant impact on reactor operation. There is no change being made to safety limits or limiting safety system settings that would adversely affect plant safety as a result of the proposed change.

   For PBAPS, the limiting overpressure AOO event is the main steam isolation valve closure with scram on high flux (MSIVF). The PBAPS ATWS Special Event evaluation considered the limiting cases for RPV overpressure and is analyzed under two cases: (1) Main Steam Isolation Valve Closure (MSIVC) and (2) Pressure Regulator Failure Open (PRFO). These events were analyzed under the proposed conditions and it was confirmed that the existing analyses remain bounding for the condition of adding a second SRV/SV Out-of-Service with a limited maximum operating power level of 3358 MWt.

   Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

   Response: No

   The proposed change would revise TS Section 3.4.3 to decrease the required number of SRVs and SVs from a total of 13 to 12, under reduced reactor thermal power operation of 3358 MWt (approximately 85% of CLTP). A compensatory

reduction in maximum allowed reactor power to 3358 MWt has been determined to conservatively offset the impact/effects of operation with an additional (up to 2) SRVs/SVs Out-of-Service. The RPV overpressure protection capability of the 12 operable SRVs and SVs is adequate at the lower power level to ensure the ASME code allowable peak pressure limits are not exceeded. The SRVs and SVs are not being modified or operated differently and will continue to operate to meet the design basis requirements for RPV overpressure protection. The proposed change does not introduce any new failure modes that could result in a new or different accident. The proposed reactor thermal power restriction of 3358 MWt is within the existing normal operating domain and no new or special operating actions are necessary to operate at the intermediate power level. The proposed change does not alter the manner in which the RPV overpressure protection system is operated and functions and thus, there is no new failure mechanisms for the overpressure protection system. The plant response to the design basis accidents, AOO events and Special Events remains bounded by existing analyses. Theses events were analyzed under the proposed conditions and it was confirmed that the existing analyses remain bounding for the condition of adding a second SRV/SV Out-of-Service with a limited maximum operating power level of 3358 MWt.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No

The margin of safety is established though the design of the plant structures, systems and components, the parameters within which the plant is operated, and the establishment of setpoints for the actuation of equipment relied upon to respond to an event. The proposed change does not change the setpoints at which the protective actions are initiated. The proposed change would revise TS Section 3.4.3 to decrease the required number of SRVs and SVs under reduced reactor thermal power operation of 3358 MWt (approximately 85% of CLTP). A compensatory reduction in maximum allowed reactor power to 3358 MWt has been determined to conservatively offset the impact/effects of operation with an additional (up to 2) SRVs/SVs Out-of-Service. The RPV overpressure protection capability of the 12 operable SRVs and SVs is adequate at the lower power level to ensure the ASME code allowable peak pressure limits are not exceeded. The plant response to the design basis accidents, AOO events and Special Events remains bounded by existing analyses. These events were analyzed under the proposed conditions and it was confirmed that the existing analyses remain bounding for the condition of adding a second SRV/SV Out-of-Service with a limited maximum operating power level of 3358 MWt.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

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

4.4 Conclusions

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

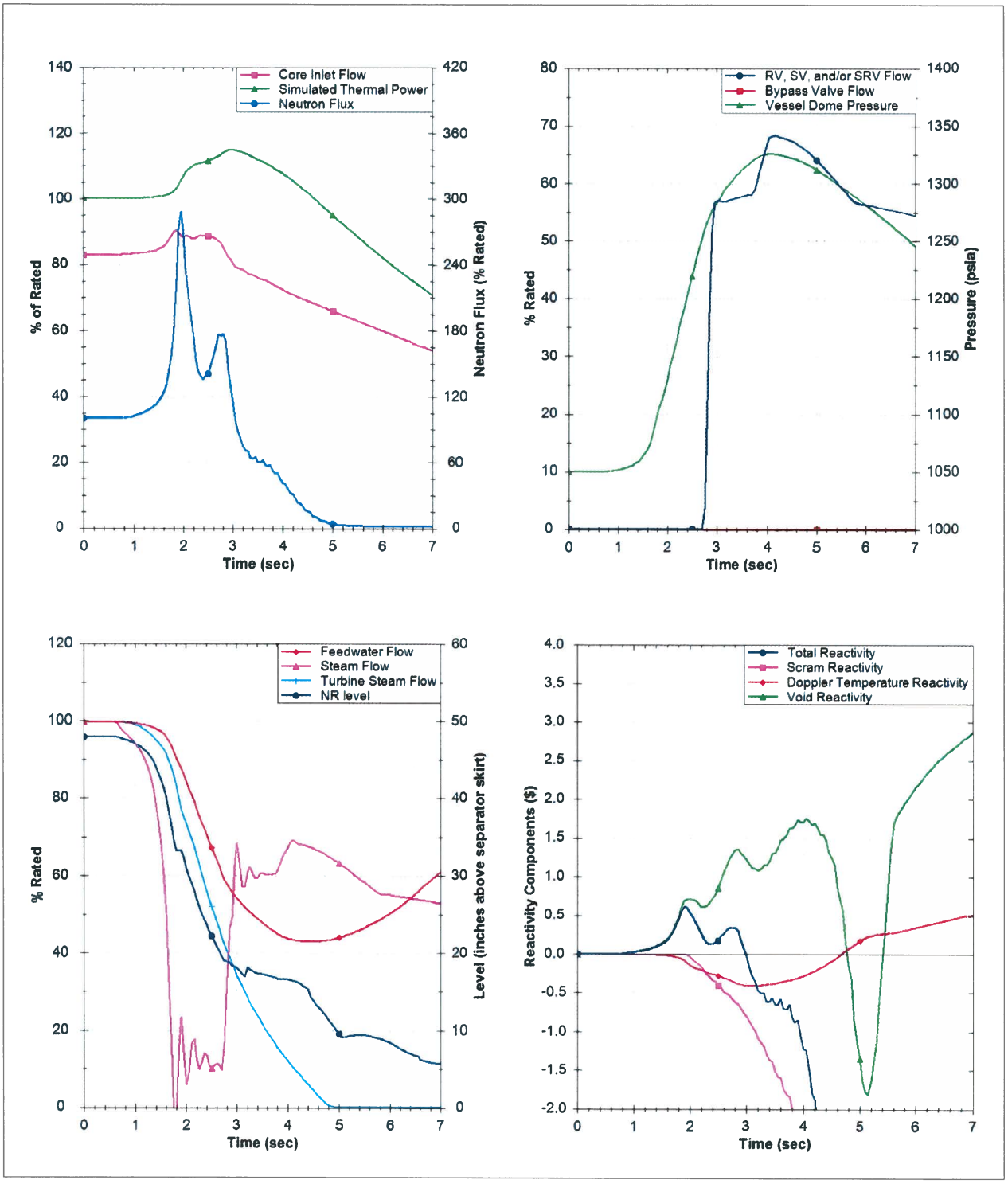
5.0 ENVIRONMENTAL CONSIDERATION

Exelon has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, "Standards for Protection Against Radiation." However, the proposed amendment does not involve: (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," paragraph (c)(9). Therefore, pursuant to 10 CFR 51.22, paragraph (b), no environmental impact statement or environmental assessment needs to be prepared in connection with the proposed amendment.

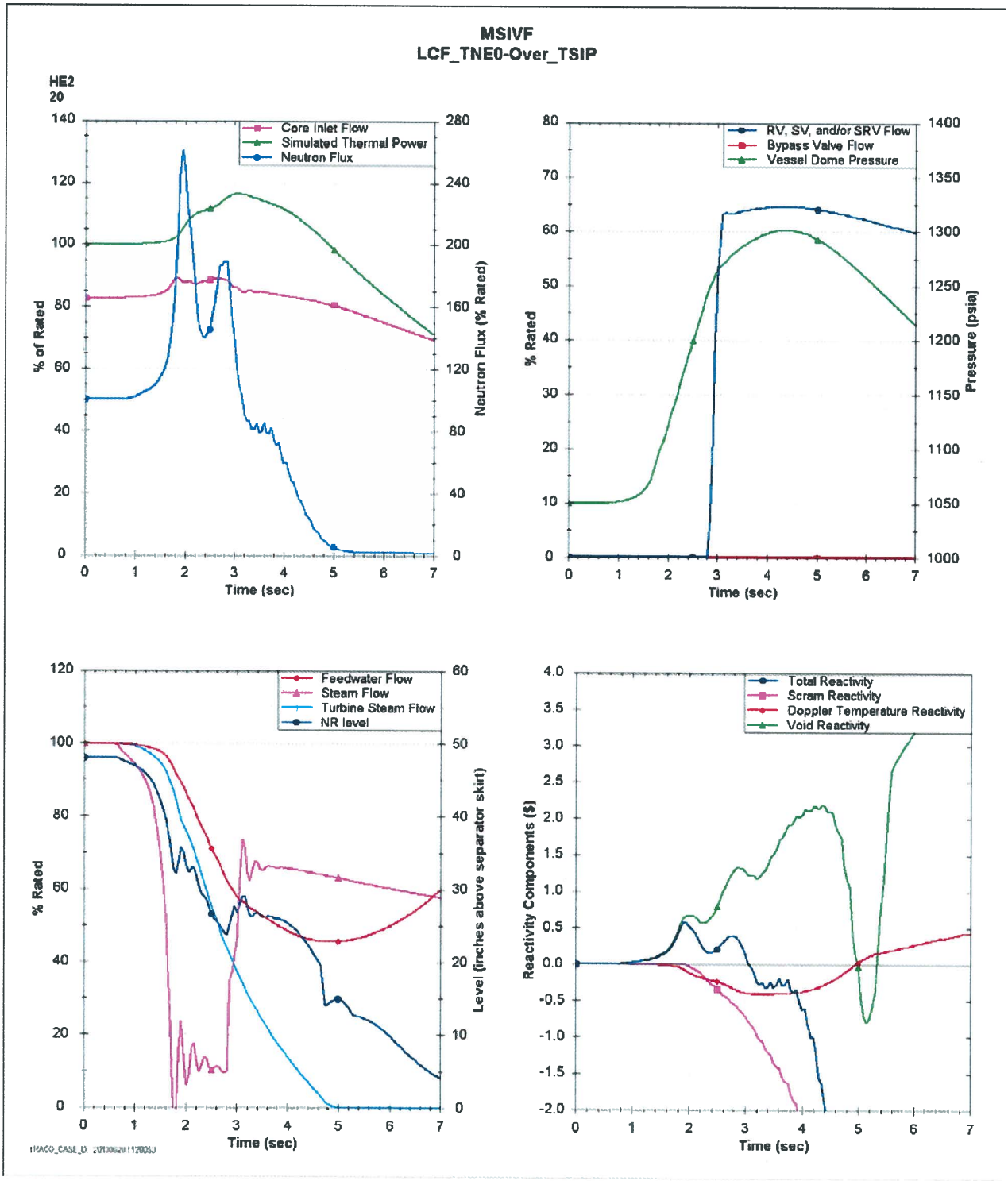
6.0 REFERENCES

None

LAR FIGURE 1
MSIVF Event – EPU Conditions (3951 MWt)



LAR FIGURE 2
MSIVF Event – Pre-EPU Conditions (3514 MWt)



ATTACHMENT 2

License Amendment Request

Peach Bottom Atomic Power Station, Unit 2
Docket No. 50-277

License Amendment Request – To Revise Technical Specifications Section 3.4.3 for the Remainder of the Current Operating Cycle for Unit 2

Markup of Proposed Technical Specifications Page

Unit 2 TS Page

3.4-8

---NOTE---
The safety function of 12 valves (any combination of SRVs and SVs) are required to be OPERABLE ≤3358 MWt during operating cycle 22.

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 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
	AND	
	A.2 Be in MODE 4.	36 hours

ATTACHMENT 3

License Amendment Request

Peach Bottom Atomic Power Station, Unit 2
Docket No. 50-277

License Amendment Request – To Revise Technical Specifications Section 3.4.3 for the Remainder of the Current Operating Cycle for Unit 2

Markup of Proposed Technical Specifications Bases Pages

Unit 2 TS Bases Page

B 3.4-16
B 3.4-16a

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, 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 and 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 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.

Insert 1 to LCO discusson added here.

(continued)

BASES (continued)

LCO

If a second SRV or SV becomes inoperable leaving 12 operable SRVs/SVs and THERMAL POWER is above 3358 MWt, then Condition A must be entered. THERMAL POWER may be reduced to less than or equal to 3358 MWt within 12 hours from when the second SRV or SV became inoperable to exit Condition A. If repairs are made such that at least 13 SRVs/SVs are operable, then operations may resume at RTP.

If during PBAPS Unit 2 Cycle 22, a second and third SRV/SV become inoperable leaving 11 operable SRVs/SVs, then Condition A will require Unit 2 to be in Mode 3 within 12 hours from when one or more required SRV/SV became inoperable. If repairs are made such that 12 SRVs/SVs are operable, then operations may resume at less than or equal to 3358 MWt. If repairs are made such that at least 13 SRVs/SVs are operable, then operations may resume at RTP.

~~(continued)~~

(continued)