FENOC

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L-06-018

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

Subject: Beaver Valley Power Station, Unit Nos. 1 and 2
BV-1 Docket No. 50-334, License No. DPR-66
BV-2 Docket No. 50-412, License No. NPF-73
Supplemental Response in Support of License Amendment Request Nos. 302 and 173 (Unit No. 1 TAC No. MC4645/Unit No. 2 TAC No. MC4646)

On October 4, 2004, FirstEnergy Nuclear Operating Company (FENOC) submitted License Amendment Request (LAR) Nos. 302 and 173 by letter L-04-125 (Reference 1). This submittal requested an Extended Power Uprate (EPU) for Beaver Valley Power Station (BVPS) Unit Nos. 1 and 2. On January 25, 2006, FENOC submitted letter L-06-003 (Reference 2), which provided additional information pertaining to the EPU LAR. However, responses to Questions 1 and 2 were not addressed at that time based on the need to modify inputs to the existing Modular Accident Analysis Program (MAAP) analysis.

Enclosure 1 provides supplemental information that contains the responses to NRC Questions 1 and 2 noted in Reference 2. This enclosure also provides the results of the re-analysis for the MAAP cases and the effects of the changes to the BVPS MAAP parameter file associated with the pressurizer surge line configuration error. In addition, the MAAP model was revised to include the changes to the quench spray termination criteria. Additional changes to operator action times are also being made to correct inaccuracy to previous data provided in the Human Reliability Analysis Summary Tables provided in Reference 3.

The re-analysis confirmed that there is no significant impact on core damage frequency (CDF) or large early release frequency (LERF) at either unit due to the changes in the MAAP model. The revised analysis results were also evaluated to ensure that there are no adverse effects on recently issued amendments regarding conversion to atmospheric

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containment, implementation of Best Estimate Loss of Coolant Accident (BELOCA) methodology, and replacement of the BVPS-1 steam generators. The responses and additional information provided by this transmittal have no impact on either the proposed Technical Specification changes or the no significant hazards consideration transmitted by Reference 1.

No new regulatory commitments are contained in this submittal. If there are any questions or if additional information is required, please contact Mr. Gregory A. Dunn, Manager – FENOC Fleet Licensing, at (330) 315-7243.

I declare under penalty of perjury that the foregoing is true and correct. Executed on February 14, 2006.

Sincerely,

Richard G. Mende

Enclosure:

1. PRA – Human Reliability

Attachments:

1. BVPS-1 Operator Action Times Using SLIM Impacted by the MAAP Re-analysis
2. BVPS-2 Operator Action Times Using SLIM Impacted by the MAAP Re-analysis

References:

1. FENOC Letter L-04-125, License Amendment Request Nos. 302 and 173, dated October 4, 2004.
2. FENOC Letter L-06-003, Additional Information in Support of License Amendment Request Nos. 302 and 173, Extended Power Uprate (EPU), dated January 25, 2006.
3. FENOC Letter L-05-192, Supplemental PRA Information in Support of License Amendment Request Nos. 302 and 173, Extended Power Uprate (EPU), dated December 9, 2005.

c: Mr. T. G. Colburn, NRR Senior Project Manager
Mr. P. C. Cataldo, NRC Senior Resident Inspector
Mr. S. J. Collins, NRC Region I Administrator
Mr. D. A. Allard, Director BRP/DEP
Mr. L. E. Ryan (BRP/DEP)

PRA – Human Reliability

Reason for the contained additional information:

During a telephone call held with the NRC reviewers on January 9, 2006, additional information and clarification was requested regarding the request for additional information (RAI) response 2.c submitted previously by FENOC submittal L-05-192 (Reference 2) for Extended Power Uprate (EPU).

This enclosure contains the FENOC responses to questions relative to Probabilistic Risk Assessment (PRA) Human Reliability. This enclosure also provides the results of the re-analysis for the Modular Accident Analysis Program (MAAP) cases and the effects of the changes to the Beaver Valley Power station (BVPS) MAAP parameter file associated with the pressurizer surge line configuration.

Results of MAAP Re-analysis:

As noted in FENOC submittal L-06-003 (Reference 1), the MAAP Station Blackout (SBO) sequences were re-analyzed as a result of the changes in the BVPS MAAP parameter file associated with the pressurizer surge line configuration error. Based on the results of the re-analysis, it was determined that core damage times for some of the SBO sequences were slightly impacted. To address these changes in core damage times, the SBO electric power recovery models were re-evaluated using the revised MAAP output. The results of the re-analysis confirmed that there is no significant impact on core damage frequency (CDF) or large early release frequency (LERF) at either unit due to the changes in the electric power recovery model.

In addition to correcting the surge line configuration error, the MAAP model was also revised to incorporate the proposed Emergency Operating Procedures (EOPs) for terminating quench spray which are based on the modifications due to the Containment Conversion (CC) license amendment. In the previous MAAP model, when quench spray termination was credited, it was terminated based solely on containment pressure dropping below the Containment Isolation Phase B (CIB) setpoint. The proposed EOPs now terminate quench spray after the safety injection transfer to cold leg recirculation is complete and the containment pressure is below the CIB setpoint.

To determine the impacts of the surge line configuration error and the revised quench spray termination criteria on the Human Reliability Assessment (HRA) and success criteria, all other remaining MAAP cases were re-analyzed. The results of the re-analysis confirmed that there are slight changes to some of the operator action times (eleven at BVPS-1 and sixteen at BVPS-2). However, at BVPS-1 only two of the eleven were determined to impact the timing performance shaping factor (PSF), and at BVPS-2 only four of the sixteen were determined to impact the timing PSF. The operator action times evaluated using the Success Likelihood Index Methodology (SLIM) that were impacted by the MAAP re-analysis are presented in Attachments 1 and 2, for BVPS-1 and BVPS-2, respectively. These attachments show the post-EPU MAAP times with and without the pressurizer loop seal configuration and previous quench spray termination criteria and the impact of these changes on the timing PSF. They also provide the basis for the timing PSF impact determination and the human error probability (HEP) used to quantify the post-EPU PRA model. Changes in the HEP are noted and presented in bold-italic print in the attachments.

The post-EPU PRA model was re-quantified using the revised SBO electric power recovery models and HEPs, confirming that there is no significant impact on CDF or LERF at either unit due to the changes in the surge line configuration error or quench spray termination criteria. No changes to the BVPS-1 or BVPS-2 success criteria were required as a result of the MAAP re-analysis.

The results of post-EPU re-quantification with the revised SBO electric power recovery models and HEPs are summarized in Table 1 and Table 2, for BVPS-1 and BVPS-2, respectively. These results were compared to the sensitivity model CDF and LERF provided in Reference 2.

Using the revised BVPS-1 post-EPU model CDF and LERF and comparing those values to the pre-EPU sensitivity model analyses provided in Reference 2, the BVPS-1 post-EPU PRA shows an increase in risk. The total CDF is increasing 2.99E-07 per year for the post-EPU conditions from the pre-EPU conditions. This is a slight increase from the 2.88E-07 CDF increase reported in Reference 2, but is still considered small (less than 1.0 E-06) and is acceptable per the guidance provided in Regulatory Guide 1.174. The total LERF is increasing 5.83E-08 per year for the post-EPU conditions from the pre-EPU conditions. This increase in total LERF is consistent with the value reported in Reference 2. This increase in LERF is considered small (less than 1.0 E-07) and is acceptable per the guidance provided in Regulatory Guide 1.174.

Similarly, using the revised BVPS-2 post-EPU model CDF and LERF and comparing those values to the pre-EPU sensitivity model analyses provided in Reference 2, the BVPS-2 post-EPU PRA is indicating an increase in risk. The total CDF is increasing 3.55E-07 per year for the post-EPU conditions from the pre-EPU conditions. This is a slight increase from the 3.41E-07 value reported in Reference 2, but is still considered small (less than 1.0 E-06) and is acceptable per the guidance provided in Regulatory Guide 1.174. The total LERF is increasing 4.61E-08 per year for the post-EPU conditions from the pre-EPU conditions. This increase in total LERF is consistent with the value reported in Reference 2. Again, this increase in LERF is considered small (less than 1.0 E-07) and is acceptable per the guidance provided in Regulatory Guide 1.174.

Table 1: BVPS-1 Results

BVPS-1 Risk Measures	Pre-EPU Sensitivity Model[1] (From L-05-192)	Revised Post-EPU Model[1]	Change In Risk (EPU - Sensitivity)
Total CDF (/year)	2.26E-05	2.29E-05	2.99E-07
Internal CDF (/year)	6.25E-06	6.55E-06	2.97E-07
External CDF (/year)	1.63E-05	1.63E-05	1.80E-09
Fire CDF (/year)	4.66E-06	4.66E-06	9.60E-10
Total LERF (/year)	4.37E-07	4.95E-07	5.83E-08

Note 1: Includes Replacement Steam Generator Tube Rupture Initiating Event Frequency

Table 2: BVPS-2 Results			
BVPS-2 Risk Measures	**Pre-EPU Sensitivity Model (From L-05-192)**	**Revised Post-EPU Model**	**Change In Risk (EPU - Sensitivity)**
Total CDF (/year)	3.30E-05	3.33E-05	3.55E-07
Internal CDF (/year)	1.86E-05	1.89E-05	2.92E-07
External CDF (/year)	1.44E-05	1.45E-05	6.32E-08
Fire CDF (/year)	4.89E-06	4.95E-06	6.38E-08
Total LERF (/year)	1.03E-06	1.07E-06	4.61E-08

Explanation for MAAP code error and effects:
The MAAP code parameter value for the pressurizer surge line loop seal configuration was originally set in 1989, during the development of a BVPS-2 plant-specific MAAP3B parameter file for the Individual Plant Examination (IPE). The reference for setting the parameter to true for the BVPS-2 model was a calculation and the MAAP guideline document, which stated: "If the surge line has a loop seal, a bend or slope in the line, such that fluid must go down and then up to travel from the primary system (hot leg) to the pressurizer, then set the flag to true." Although there may be a downward deflection of the surge line due to thermal effects such that the fluid must go down and then up, there is not enough movement to effectively form a loop seal, which was assumed at the time. This identified error has been entered into our Corrective Action Program. This parameter affects MAAP results only when the Reactor Coolant System (RCS) hot leg is drained.

The MAAP analysis was originally developed and used for the current Probabilistic Risk Assessment (PRA) models, post-EPU PRA models, and the simulator validation for the current and replacement steam generators. The MAAP code was also used for determining Mass and Energy (M&E) releases for a Small Break Loss-of-Coolant-Accident (SBLOCA) and containment response to LOCA's and Main Steam Line Break (MSLB) accidents in conjunction with the Containment Conversion License Amendment Requests (LARs).

Based on the post-EPU PRA model impact assessment for just the surge line configuration error, it was determined that there are no significant changes to the current pre-EPU PRA model. Also, since the surge line configuration error only affects the MAAP results when the RCS hot leg is drained, it was determined that there are no significant changes to the simulator validation of the current and replacement steam generators, which used the MAAP code. There is no impact on the MAAP results associated with the current PRA model or the simulator validations due to the revised quench spray termination criteria since the proposed EOPs that contain the revised criteria are based on the modifications due to the Containment Conversion LARs.

The pressurizer surge line configuration has no effect on the calculation of containment response which formed the basis for the Containment Conversion LARs. The pressurizer surge line is included as part of the primary system model in MAAP. This model is only used to develop M&E release rates for SBLOCA events. The M&E release rates for Large Break LOCA events and Main Steam Line Break events are generated using approved Westinghouse methodologies which are unaffected by this surge line configuration error. The modeling of containment response in MAAP is separate and distinct from the primary system modeling and is therefore unaffected by the surge line parameter issue.

Since the primary system model is used to generate M&E release rates for SBLOCA, an assessment was performed to determine if this issue would impact the results of the analyses performed to support the Containment Conversion LARs. A set of SBLOCA cases were run with the surge line configuration parameter corrected to the proper value. The results of these runs indicated that there was no change in the M&E release rates for SBLOCA cases. The results of the analyses performed continue to support the Containment Conversion LARs.

Responses to NRC additional questions relative to PRA Human Reliability are provided below:

Question:

Justify that the following operator actions can be completed within the time frame from receipt of the cue for the action to the point at which an irreversible plant state leading to core damage is reached under EPU conditions. List the key action steps for each action. Describe whether the actions take place in the control room or outside the control room. Provide the basis for the conclusion that the time available is sufficient to complete the action (e.g., information from simulator observations, job performance measures, walk-through, talk-through, etc.). (Important operator actions with relatively short time available were identified by the NRC and provided to the licensee.)

Response:

A human reliability analysis has been performed for the Extended Power Uprate (EPU) conditions at Beaver Valley Power Station Unit No. 1 (BVPS-1) and Unit No. 2 (BVPS-2). The results of this analysis are provided in Reference 2. The operator actions were reviewed to determine if the total time available, per thermal-hydraulic analysis, was sufficient to complete the operator action. The review considered the total time available, which includes the time from the beginning of the sequence until the operator is cued to perform the action and the time to perform the action. The results of the review are contained in Table 3 and Table 4. The results show that the operator actions can be performed in the total time available. The tables list the operator actions and indicate whether the action can be completed within the time from receipt of the cue to the point at which an irreversible plant state is reached. The tables include the methods in which the operator action times were confirmed. As shown in the tables, several operator actions were confirmed using multiple methods. In addition, the BVPS-2 talk-through confirmation was also based on simulator observations of different operating crews by the Operations Management Team (Licensed Senior Reactor Operators). Each method successfully demonstrated that the total time available for a given sequence was more than sufficient to complete the given operator action. Additionally, the Probabilistic Risk Assessment (PRA) Human Reliability Analysis (HRA) methodology change process from the Success Likelihood Index Methodology (SLIM) to the HRA Calculator requires that the risk significant operator actions are reviewed using the control room simulator or tabletop discussions prior to implementation of the updated PRA model.

Table 3: BVPS-1 Important Operator Actions with Short Time Available						
Operator Action	**Can Action Be Completed In The Time Available?**	**Total Time Available**	**Cue Time**	**Action Time**	**Confirmation Method**	**Control Room or Local Action**
OPRCD4	Yes	24 hours	10 minutes	9 minutes	Talk/Walk-through	Local
OPRCD5	Yes	2.68 hours	30 minutes	9 minutes	Talk/Walk-through	Local
OPRCD6	Yes	72 minutes[1]	20 minutes	2 minutes	Talk-through & Simulator Observation	Control Room
OPRCD7	Yes	72 minutes[1]	20 minutes	9 minutes	Talk/Walk-through	Local
OPRHH1	Yes	56 minutes	5 minutes	20 minutes	Talk/Walk-through	Local
OPRMU2	Yes	4.23 hours[2]	1.28 hours	20 minutes	Talk-through	Local
OPROB1	Yes	42 minutes	10.4 minutes	4 minutes	Talk-through & Simulator Observation	Control Room
OPROB2	Yes	29 minutes	8.5 minutes	7 minutes	Talk-through & Simulator Observation	Control Room
OPRWA1	Yes	1 hour	2 minutes	3 minutes	Talk-through & Simulator Observation	Control Room
OPRWA2	Yes	13 minutes[3]	2 minutes	3 minutes	Talk-through	Control Room
OPRWA5	Yes	1 hour[4]	2 minutes	15 minutes	Talk/Walk-through	-Control Room: trip EDG -Local: start diesel-driven fire pump
OPRWA8	Yes	1 hour	2 minutes	12 minutes	Talk-through	Local
OPRXT1	Yes	3.1 hours[5]	2 minutes	35 minutes	Talk/Walk-through	Local
OPROS1	Yes	43 minutes	2 minutes	10 minutes	Talk-through & Simulator Observation	Control Room
OPROS2	Yes	56 minutes	2 minutes	10 minutes	Talk-through	Control Room

NOTES:

1. The time provided in Table 3-6 of L-05-192 (Reference 2) was one hour. The one hour was the time evaluated using the SLIM process for the operator to initiate the action, and did not include

any additional time before reaching the irreversible damage state. There is a total of 1.2 hours (72 minutes) available from initiating event until reaching the irreversible damage state (i.e., core damage). Based on simulator data, the cue time to perform the action is about 20 minutes. This creates 52 minutes after the cue for the operator to perform the action. This change in total time available is due to including the additional time before reaching the irreversible damage state, and does not impact the human error probability.

2. The time reported in Table 3-6 of L-05-192 (Reference 2) was erroneously reported as the BVPS-2 time of 2.58 hours, but the action was actually evaluated using BVPS-1 time of 1.9 hours, as reflected in Table 3-1 of L-05-140 (Reference 3). This was the time available after the cue which was used to assess the timing performance shaping factor. Based on the MAAP re-analysis (see Attachment 1), there are 2.95 hours available to deplete the RWST following the cue. Including the cue time of 1.28 hours, this gives a total time of 4.23 hours from the start of the transient. This change in total time available does not impact the human error probability.
3. The time reported in Table 3-6 of L-05-192 (Reference 2) was 1 hour. During the operator action confirmation, it was determined that the time available should be 13 minutes, based on time to overheat the diesel generator. The change from 1 hour to 13 minutes still leaves adequate time for the operator to complete the action. This additional action does not impact the complexity PSF, which was evaluated as a 5. Therefore, the human error probability is not impacted.
4. The time reported in Table 3-6 of L-05-192 (Reference 2) was 1 hour. During the operator action confirmation it was determined that this total time available is still valid. However, the operators must trip the EDGs from the control room prior to 13 minutes, based on time to overheat the diesel generator, then proceed with local actions to align the diesel driven fire pump. This additional action does not impact the task complexity PSF. There is no impact on human error probability.
5. This time was erroneously reported as N/A in Table 3-6 of L-05-192 (Reference 2), but the action was analyzed based on 3.1 hours. This is an editorial correction to the documentation and does not impact the human error probability results.

Table 4: BVPS-2 Important Operator Actions with Short Time Available						
Operator Action	**Can Action Be Completed In The Time Available?**	**Total Time Available**	**Cue Time**	**Action Time**	**Confirmation Method**	**Control Room or Local Action**
OPRCS1	Yes	26 minutes[1]	5 minutes	2 minutes	Talk-through	Control Room
OPROF1	Yes	26 minutes[1]	5 minutes	7 minutes plus 5 minutes for valves to stroke full open	Talk-through	Control Room
OPROF2	Yes	26 minutes[1]	5 minutes	2 minutes	Talk-through	Control Room
OPRCD6	Yes	72 minutes[2]	20 minutes	2 minutes	Talk-through	Control Room
OPRCD7	Yes	72 minutes[2]	20 minutes	9 minutes	Talk/Walk-through	Local
OPROA1	Yes	10 minutes[3]	1 minute	3 minutes	Talk-through	Control Room
OPRMU2	Yes	9.65 hours[4]	1.79 hours	20 minutes	Talk/Walk-through	Local
OPROB1	Yes	64 minutes[5]	28.3 minutes	4 minutes	Talk-through	Control Room
OPROB2	Yes	35 minutes[6]	18.4 minutes	7 minutes	Talk-through	Control Room
OPRWA1	Yes	1 hour[7,8]	2 minutes	13 minutes	Talk-through	Control Room: trip EDG Local: start spare pump
OPRWA2	Yes	1 hour[7]	2 minutes	12 minutes	Talk-through	Local
OPRWA3	Yes	13 minutes[9]	2 minutes	4 minutes	Talk-through	Control Room
OPRWA4	Yes	1 hour[7]	2 minutes	15 minutes	Talk/Walk-through	Local
OPRWA6	Yes	1 hour[7]	2 minutes	10 minutes	Talk-through	Local
OPRXT1	Yes	3.1 hours[10]	2 minutes	35 minutes	Talk/Walk-through	Local
OPROS1	Yes	43 minutes	2 minutes	10 minutes	Talk-through	Control Room
OPROS2	Yes	55 minutes	2 minutes	10 minutes	Talk-through	Control Room
OPROS6	Yes	43 minutes	2 minutes	5 minutes	Talk-through	Control Room

NOTES:

1. The time provided in Table 3-7 of L-05-192 (Reference 2) was 0.72 hours, the corresponding time to steam generator dry out. The completion of these actions is required in order to re-establish main feedwater. During the operator action confirmation, it was determined that the correct success criteria for this operator action should be the time to reach 13% steam generator wide range (WR) level, after which feed and bleed cooling would commence. These actions to restore main feedwater are not credited if the initiating event is a partial or total loss of main feedwater. Therefore, 26 minutes is the corresponding time to reach the 13% WR level and is conservatively based on a reactor trip with the RCPs not tripped. This change in total time available does not impact the human error probability.

2. The time provided in Table 3-7 of L-05-192 (Reference 2) was one hour. The one hour was the time evaluated using the SLIM process for the operator to initiate the action, and did not include any additional time before reaching the irreversible damage state. There is a total of 1.2 hours (72 minutes) available from initiating event until reaching the irreversible damage state (i.e., core damage). Based on simulator data, the cue time to perform the action was about 20 minutes. This creates 52 minutes after the cue for the operator to perform the action. This change in total time available is due to including the additional time before reaching the irreversible damage state, and does not impact the human error probability.

3. No MAAP analysis is made for this operator action. The allowable time for this action is assumed to be 10 minutes. This time is consistent with the Westinghouse Owner's Group assumption, as documented in WCAP-11993, dated December 1988. If there is not a small LOCA following the reactor trip failure, the time available for this may be longer. However, the 10 minute time is conservatively used for all such sequences. As the 10 minutes was used in the analysis, there is no need for a change in time available.

4. The time reported in Table 3-7 of L-05-192 (Reference 2) was 2.58 hours to complete the actions, and did not include any cue time of 1.79 hours. Based on the MAAP re-analysis (see Attachment 2), there is 7.86 hours available to deplete the RWST following the cue. This gives a total time of 9.65 hours from the start of the transient. This operator action was reevaluated and the new human error probability is documented in Attachment 2.

5. The time provided in Table 3-7 of L-05-192 (Reference 2) was 42 minutes based on the BVPS-1 total time available to implement feed and bleed cooling, given that the RCPs were successfully tripped at 5 minutes (Top Event OF=S). During the operator action confirmation, it was noted that the time to reach the feed and bleed entry conditions (13% SG WR level) and the steam generator dryout time were significantly longer at BVPS-2, when compared to the RSGs at BVPS-1. Therefore, the revised total time available to complete the action is estimated from the BVPS-1 feed and bleed success timing, or about 20 minutes prior to SG dryout, which occurs at 84.4 minutes at BVPS-2, given a total loss of main feedwater and tripping the RCPs at 5 minutes. This change in total time available does not impact the human error probability.

6. The time provided in Table 3-7 of L-05-192 (Reference 2) was 29 minutes based on the BVPS-1 total time available to implement feed and bleed cooling, given that the RCPs were not previously tripped (Top Event OF=F). During the operator action confirmation, it was noted that the time to reach the feed and bleed entry conditions (13% SG WR level) and the steam generator dryout time were significantly longer at BVPS-2, when compared to BVPS-1. Therefore, the revised total time available to complete the action is estimated from the BVPS-1 feed and bleed success timing, or about 3 minutes prior to SG dryout, which occurs at 38.6 minutes at BVPS-2, given a total loss of main feedwater and not tripping the RCPs. This change in total time available does not impact the human error probability.

7. The time provided in Table 3-7 of L-05-192 (Reference 2) for the WA (OPRWA*) operator actions were based on 30 minutes until increased RCP seal leakage was expected to begin, and did not credit any thermal capacity of the service water or component cooling water systems, whereas the similar BVPS-1 timings did. To be consistent with BVPS-1, these times are set back to 1 hour

to credit the thermal capacity. It should be noted, however, that the PSF were not altered as a result of these changes, as evident in the pre-EPU versus post-EPU values provided in Table 3-7.

8. During the operator action confirmation it was determined that the operators must trip the EDGs from the control room prior to 13 minutes, based on time to overheat the diesel generator, then proceed with local actions to align the spare service water pump. This additional action does not impact the task complexity PSF. This change does not impact the human error probability.

9. The time reported in Table 3-7 of L-05-192 (Reference 2) was 30 minutes. During the operator action confirmation, it was estimated that the time available should be about 13 minutes, based on time to overheat a BVPS-1 diesel generator. The change from 30 minutes to 13 minutes still leaves adequate time for the operator to complete the action. Therefore, the human error probability is not impacted.

10. This time was erroneously reported as N/A in Table 3-6 of L-05-192 (Reference 2), but the action was analyzed based on 3.1 hours. This is an editorial correction to the documentation and does not impact the human error probability results.

Question:

Please provide additional information as detailed below:

Question:

a. **Unit 1 OPRCD4 - No modular accident assessment program (MAAP) analysis is referenced for this operator action. What is the basis for the reduction in human error probability from 8.3E-2 in BV1REV3 to 5.1E-2 in the "EPU RAI" model?**

Response:

The MAAP analyses were performed for operator action OPRCD4 for EPU conditions. The MAAP analyses indicated a time available of 24 hours for the post-EPU conditions, which is an increase in time when compared to the pre-EPU conditions. The Human Reliability Analysis for the Extended Power Uprate PRA was performed using the Success Likelihood Index Methodology (SLIM). In this methodology, values are assigned to various performance shaping factors, one of which is time. The time performance shaping factor describes the amount of time available to the operator and how that time impacts the operator performance. With an increase in time available, the time performance shaping factor was adjusted to reflect the increased time available. Under pre-EPU conditions, the time available will provide enough time for the operator to complete the action at a normal speed and to verify results.

The pre-EPU time allowed to complete this operator action was erroneously reported as 3.1 hours in Reference 2. The correct time is 11 hours, and is based on a simulator run time to cooldown to 212°F (about 10 hrs) subtracted from a simplified hand calculation time to deplete the RWST (about 21 hrs). The hand calculation provided a conservative estimate of RWST depletion time for this operator action. The post-EPU MAAP analysis performed for the EPU conditions resulted in a best-estimate time of about 34 hrs to deplete the RWST, which resulted in a new time to complete the action of 24 hours.

Question:

b. **Unit 1 OPRMU2 and OPRMU5 - Why is the time available for refueling water storage tank make-up much shorter (0.79 hours) for small break loss of coolant accident (LOCA) than the time available (7 hours) for an inter-system LOCA? Explain why the small break LOCA human error probability for this action (6.25E-3) is smaller than for the inter-system LOCA (1.01E-2).**

Response:

The OPRMU2 action models the operators' ability to provide borated makeup to the Refueling Water Storage Tank (RWST) during small loss of coolant (LOCA) sequences. The scenario develops as an automatic reactor trip accompanied by a safety injection signal due to a small break in the primary system. The automatic functions operate as expected, and the plant parameters are consistent with what would be expected for a small break with plant trip and safety injection. The time available is until the RWST level drops below the suction point for the High Head Safety Injection pumps. Both Quench Spray pumps operate, thereby increasing the RWST depletion rate and decreasing the time available to provide makeup to the RWST.

The OPRMU5 action models the operators' ability to provide borated makeup to the RWST following LOCAs outside containment. The plant is initially operating at 100% power. Leakage

develops in one of the cold leg injection lines connecting the Low Head Safety Injection (LHSI) system to the Reactor Coolant System (RCS), which eventually ruptures the piping. The leak rate is large enough to cause a low pressurizer pressure reactor trip condition, and generate a Safety Injection (SI) signal. As the pipe break occurs outside of containment, there is no containment pressurization. Subsequently, Quench Spray does not actuate and only the Safety Injection system draws suction from the RWST.

The small break LOCA human error probability (OPRMU2), as shown in Table 3-6 of L-05-192 (Reference 2), is 1.01E-02. The inter-system LOCA human error probability (OPRMU5), as shown in this table is 6.25E-03. The OPRMU5 human error probability is smaller than the OPRMU2 human probability due to the additional time available to complete the action, as described above.

Question:

c. Unit 1 OPROS1 and OPROS2 - Why is there less time available (0.72 hours) for manually actuating safety equipment during a transient event (OPROS1) than the time available (0.94 hours) for the same action, given a small LOCA or steam line break (OPROS2)?

Response:

The difference in time available is due to a difference in success criteria for each operator action. Operator action OPROS1 is the action to actuate Auxiliary Feedwater and SI equipment following a valid safety injection signal without a LOCA transient event (e.g., steam line break). Since there is a non-LOCA condition, success timing is based on the operator actuating Auxiliary Feedwater prior to the steam generators boiling dry, conservatively assuming that the RCPs are not tripped. Operator Action OPROS2 is the action to actuate SI equipment during a small LOCA event. Since there is an actual LOCA condition in this scenario, success is based on the time required for the operator to actuate the SI systems prior to core uncovery caused by the LOCA. Thus, as the two operator actions have different success criteria, a direct comparison of time available should not be made.

Question:

d. Unit 2 OPRMU2 - Why is the pre-EPU time available (1.55 hours) less than the post-EPU time available (2.58 hours), given that both times were determined using MAAP?

Response:

The increase in time for the EPU model is a result of the revised Containment Isolation Phase B (CIB) and CIB reset points. For post-EPU conditions, CIB occurs at 24 psia and CIB reset is at 22.3 psia. The MAAP model actuates containment sprays when containment pressure reaches the CIB set point and secures containment sprays approximately 5 minutes later, when the containment pressure decreases to the CIB reset pressure. However, containment sprays come back on within the next minute and continue to cycle to maintain containment pressure between the CIB and CIB reset points. This model for the containment spray operation delays the time for the Refueling Water Storage Tank to empty. The time reported for operator action OPRMU2 in Table 3-7 of L-05-192 (Reference 2), was erroneously reported as 2.58 hours in the HRA MAAP analysis, which resulted in assigning a timing PSF of 2. The correct time between the SI cold leg recirculation and RWST depletion is 6.46 hours. It should be noted that with the

proposed EOP changes, which are based on the modifications due to the CC license amendment, the post-EPU time available to perform operator action OPRMU2 is now 7.86 hours. This is a result of waiting to reset the CIB and containment spray termination until after the transfer to SI cold leg recirculation. This reduces the time to transfer to SI cold leg recirculation and RWST depletion, when compared to the previous post-EPU case. However, it increases the time between the SI cold leg recirculation and RWST depletion due to less cycling of the containment sprays, since the containment pressure is lower once the CIB reset condition is met. Based on a post-EPU time available of 7.86 hours, the OPRMU2 HEP was re-evaluated with a timing PSF of 0, as shown in Attachment 2.

In contrast, the pre-EPU CIB reset point is when containment pressure is below atmospheric pressure, so it was not considered in the MAAP model, and containment sprays continuously operate once the CIB setpoint is reached until RWST depletion.

Question:

e. Unit 2 OPROS2 - Why is the pre-EPU time available (0.89 hours) less than the post-EPU time available (0.94 hours), given that both times were determined using MAAP?

Response:

The time difference between the pre-EPU and post-EPU models (0.89 hours and 0.94 hours, respectively) is a 3 minute change in timing of core uncovery. This small time change is caused by many subtle changes between the pre-EPU and EPU models. For example, the pre-EPU model initial pressurizer level is 17.8 ft while the initial pressurizer level in the EPU model is 21.7 ft. This change in initial pressurizer level does not explain the entire timing difference, but rather serves as one example of a change in model configuration that could cause a timing change on the order of a few minutes.

The small difference in time of core uncovery does not impact the OPROS2 human error probability (HEP). As shown in Table 3.7 of L-05-192 (Reference 2), the OPROS2 HEP for the sensitivity model (which is an adjustment of the pre-EPU model) is equal to the OPROS2 HEP for the "EPU RAI" model (which is representative of EPU conditions).

It should be noted, that due to the surge line configuration error, the post-EPU time available is now 0.93 hours, as shown in Attachment 2. However, since this is less than a 1-minute change in the time to core uncovery, the timing PSF was not altered, and the HEP remains unchanged.

References

1. FENOC Letter L-06-003, Additional Information in Support of License Amendment Request Nos. 302 and 173, Extended Power Uprate (EPU), dated January 25, 2006.

2. FENOC Letter L-05-192, Supplemental PRA Information in Support of License Amendment Request Nos. 302 and 173, Extended Power Uprate (EPU), dated December 9, 2005.

3. FENOC Letter L-05-140, Response to a Request for Additional Information (RAI dated August 2, 2005) in Support of License Amendment Request Nos. 302 and 173, Extended Power Uprate, dated September 6, 2005.

4. FENOC Letter L-05-104, Probabilistic Safety Review for License Amendment Request Nos. 302 and 173, dated June 14, 2005.

ATTACHMENT 1: BVPS-1 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS						
Operator Action	**Action Description**	**Previous Post-EPU MAAP Timings**	**Revised Post-EPU MAAP Timings**	**Impact on Timing PSF**	**Post-EPU Human Error Probability**	**Basis For the Timing PSF Impact Determination**
OPRCD1	Operator depressurizes the RCS to 400 psig by dumping steam through the steam generator atmospheric steam dumps to depressurize and cool down the secondary side (small LOCA).	6.63 hours	2.87 hours	No Impact	No Change 1.71E-03	Time difference equates to a decrease of 3.76 hours due to the quench spray termination revision. The performance shaping factor was previously evaluated to be 2. A performance shaping factor of 2 indicates there is more than sufficient time to perform the action. This time difference does not impact the performance shaping factor or the human error probability as this is a quick control room action.
OPRCD2	Operator depressurizes the RCS to 400 psig by dumping steam through the steam generator atmospheric steam dumps to depressurize and cool down the secondary side; AC orange power has failed and operators have to locally manipulate the steam generator atmospheric steam dumps to cooldown.	11.6 hours	4.88 hours	No Impact	No Change 2.58E-03	Time difference equates to a decrease of 6.72 hours due to the quench spray termination revision. The performance shaping factor was previously evaluated to be 2. A performance shaping factor of 2 indicates there is more than sufficient time to perform the action. Although this is a local action, there is more time available when compared to OPRCD1, thus the time difference does not impact the performance shaping factor or the human error probability.

ATTACHMENT 1: BVPS-1 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS						
Operator Action	**Action Description**	**Previous Post-EPU MAAP Timings**	**Revised Post-EPU MAAP Timings**	**Impact on Timing PSF**	**Post-EPU Human Error Probability**	**Basis For the Timing PSF Impact Determination**
OPRCI1	Operator locally closes the RCP seal return isolation valves outside the containment given a loss of all AC power (station blackout).	0.91 hours	0.83 hours	No Impact	No Change 2.45E-03	Time difference equates to a decrease of 4.8 minutes and is due to the surge line configuration error. The performance shaping factor was previously evaluated to be 1. A performance shaping factor of 1 indicates there is more than sufficient time to perform the action. This time difference does not impact the performance shaping factor or the human error probability.
OPRMU1	***Operators provide borated makeup water to the RWST initially from the spent fuel pool, and, in the long term, from blending operations following a steam generator tube rupture event with stuck-open PORV.***	***4.03 hours***	***1.23 hours***	***YES***	***Revised*** ***1.10E-02***	***Time difference equates to a decrease of 2.8 hours. Timing difference is due to securing containment spray at CIB reset pressure. The operator action has been re-evaluated. In Reference 3 (L-05-140), the performance shaping factor was evaluated to be a 1. With the decrease in time, the performance shaping factor is reevaluated to be a 4. The resulting human error probability is 1.10E-02. The human error probability was reported in Reference 3 as 8.40E-03.***
OPRMU2	Operators provide borated makeup water to the RWST initially from the spent fuel pool, and, in the long term, from blending operations following a small LOCA.	1.9 hours	2.95 hours	No Impact	No Change 1.01E-02	Time difference equates to an increase of 63 minutes. Timing difference is due to securing containment spray at CIB reset pressure. The performance shaping factor was previously evaluated to be 3. A performance shaping factor of 3 indicates there is sufficient time to perform the action. This time difference does not impact the performance shaping factor or the human error probability.

ATTACHMENT 1: BVPS-1 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS

Operator Action	Action Description	Previous Post-EPU MAAP Timings	Revised Post-EPU MAAP Timings	Impact on Timing PSF	Post-EPU Human Error Probability	Basis For the Timing PSF Impact Determination
OPRMU3	Operators provide borated makeup water to the RWST initially from the spent fuel pool, and, in the long term, from blending operations following a medium LOCA.	0.36 hours	0.49 hours	No Impact	No Change 1.79E-02	Time difference equates to an increase of 7.8 minutes. Timing difference is due to securing containment spray at CIB reset pressure. The performance shaping factor was previously evaluated to be a 5. A PSF of 5 indicates adequate time to complete the action at normal speed. This time difference does not impact the performance shaping factor or the human error probability.
OPROR1	Operators manually initiate recirculation mode of operation by starting the RSS pumps, aligning power supplies to appropriate RSS equipment, resetting safety injection system and verifying RW flow to RSS headers, following a small LOCA event.	2.82 hours	1.68 hours	No Impact	No Change 1.88E-03	Timing difference is due to securing containment spray at CIB reset pressure. The performance shaping factor was previously evaluated to be a 1. A performance shaping factor of 1 indicates there is more than sufficient time to perform the action. Operator action has been reevaluated with the new time and it is determined that there is no change in performance shaping factor or the human error probability.

ATTACHMENT 1: BVPS-1 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS						
Operator Action	**Action Description**	**Previous Post-EPU MAAP Timings**	**Revised Post-EPU MAAP Timings**	**Impact on Timing PSF**	**Post-EPU Human Error Probability**	**Basis For the Timing PSF Impact Determination**
OPROR2	***Operators align outside recirculation spray trains A or B to the LHSI flow path for high pressure recirculation, given that both LHSI supply trains fail.***	***2.82 hours***	***1.68 hours***	***YES***	***Revised*** ***3.12E-03***	***This decrease in time results in a change to the operator action performance shaping factor. Timing difference is due to securing containment spray at CIB reset pressure. In Reference 3 (L-05-140) the performance shaping factor was evaluated as a 1, indicating more than sufficient time to perform the action. The performance shaping factor was re-evaluated as a 3. The resulting human error probability is 3.12E-03. The human error probability was reported in Reference 3 as 2.60E-03.***
OPRPI1	Operator isolates the RCS relief paths due to stuck-open pressurizer PORVs after they were used to depressurize the RCS, by closing the PORV block valves associated with the stuck-open PORVs.	0.91 hours	0.83 hours	No Impact	No Change 6.14E-04	Time difference equates to a decrease of 4.8 minutes and is due to the surge line configuration error. The performance shaping factor was previously evaluated to be a 3. A performance shaping factor of 3 indicates there is sufficient time to perform the action. This time difference does not impact the performance shaping factor or the human error probability.
OPRPK1	Operator isolates stuck-open Pressurizer PORV used to depressurize, given ATWS.	0.91 hours	0.83 hours	No Impact	No Change 7.10E-04	Time difference equates to a decrease of 4.8 minutes and is due to the surge line configuration error. The performance shaping factor was previously evaluated to be a 3. A performance shaping factor of 3 indicates there is sufficient time to perform the action. This time difference does not impact the performance shaping factor or the human error probability.

ATTACHMENT 1: BVPS-1 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS						
Operator Action	**Action Description**	**Previous Post-EPU MAAP Timings**	**Revised Post-EPU MAAP Timings**	**Impact on Timing PSF**	**Post-EPU Human Error Probability**	**Basis For the Timing PSF Impact Determination**
OPRRE6	Operator recovers both trains of fast transfer breakers following a plant trip, which results in a PORV LOCA, with accompanying emergency diesel generator failures.	0.91 hours	0.83 hours	No Impact	No Change 2.26E-02	Time difference equates to a decrease of 4.8 minutes and is due to the surge line configuration error. The performance shaping factor was previously evaluated to be an 8. A performance shaping factor of 8 indicates rapid action must be taken to complete the action successfully. The operator action has been reevaluated and a change of 4.8 minutes does not impact the performance shaping factor or the human error probability.

ATTACHMENT 2: BVPS-2 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS						
Operator Action	**Action Description**	**Previous Post-EPU MAAP Timings**	**Revised Post-EPU MAAP Timings**	**Impact on Timing PSF**	**Post-EPU Human Error Probability**	**Basis For the Timing PSF Impact Determination**
OPRCD1	*Operator depressurizes the RCS to 400 psig by dumping steam through the SG atmospheric steam dumps to depressurize and cool down the secondary side (small LOCA). (2 Quench Spray Pumps operate.)*	*6.63 hours*	*8.65 hours*	*YES*	*Revised* *5.99E-04*	*Time difference equates to an increase of 1.79 hours. Timing difference is due to securing containment spray at CIB reset pressure. In Reference 3 (L-05-140), the performance shaping factor was evaluated to be a 1. The operator action has been reevaluated with the performance shaping factor evaluated as a 0. The resulting human error probability is 5.99E-04. The human error probability was reported in Reference 3 as 6.88E-04.*
OPRCD2	*Operator depressurizes the RCS to 400 psig by dumping steam through the steam generator atmospheric steam dumps to depressurize and cool down the secondary side; AC Orange power has failed and operators have to locally manipulate the SG atmospheric steam dumps to cool down. (One Quench Spray Pump operates)*	*11.6 hours*	*8.87 hours*	*YES*	*Revised* *4.29E-03*	*Time difference equates to a decrease of 2.96 hours. Timing difference is due to securing containment spray at CIB reset pressure. In Reference 3 (L-05-140), the performance shaping factor was evaluated to be a 1. The operator action has been reevaluated with the performance shaping factor evaluated as a 2. The resulting human error probability is 4.29E-03. The human error probability was reported in Reference 3 as 3.73E-03.*

ATTACHMENT 2: BVPS-2 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS						
Operator Action	**Action Description**	**Previous Post-EPU MAAP Timings**	**Revised Post-EPU MAAP Timings**	**Impact on Timing PSF**	**Post-EPU Human Error Probability**	**Basis For the Timing PSF Impact Determination**
OPRCD5	Operator depressurizes the RCS to 400 psig by locally manipulating the steam generator atmospheric steam dumps to relieve steam during a station blackout (SBO).	2.61 hours	2.62 hours	No Impact	No Change 2.36E-02	Time difference equates to a decrease of less than 1 minute and is due to the surge line configuration error. The performance shaping factor was previously evaluated to be a 5. A PSF of 5 indicates adequate time to complete the action at normal speed. This time difference does not impact the PSF or human error probability.
OPRHH2	Operators fail to properly monitor plant parameters and prematurely secure the safety injection system.	19.62 hours	19.85 hours	No Impact	No Change 4.44E-04	Time difference equates to an increase of 14 minutes and is due to the surge line configuration error. The performance shaping factor was previously evaluated to be 1. A performance shaping factor of 1 indicates there is more than sufficient time to perform the action. This time difference does not impact the PSF or human error probability.
OPRMU1	***Operators provide borated makeup water to the RWST initially from the spent fuel pool, and in the long term, with makeup from service water following a transient-initiated small LOCA or SGTR.***	***6.46 hours[1]***	***15.72 hours***	***YES***	***Revised*** ***4.54E-03***	***Timing difference is due to securing containment spray at CIB reset pressure. In Reference 3 (L-05-140), the performance shaping factor was evaluated to be a 2, based on 2.58 hours. The operator action has been reevaluated with the performance shaping factor evaluated as a 0. The resulting human error probability is 4.54E-03. The human error probability was reported in Reference 3 as 5.45E-03.***

ATTACHMENT 2: BVPS-2 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS						
Operator Action	**Action Description**	**Previous Post-EPU MAAP Timings**	**Revised Post-EPU MAAP Timings**	**Impact on Timing PSF**	**Post-EPU Human Error Probability**	**Basis For the Timing PSF Impact Determination**
OPRMU2	***Operators provide borated makeup water to the RWST initially from the spent fuel pool, and in the long term, with makeup from service water following a small LOCA.***	***6.46 hours[1]***	***7.86 hours***	***YES***	***Revised*** ***4.54E-03***	***Timing difference is due to securing containment spray at CIB reset pressure. In Reference 3 (L-05-140), the performance shaping factor was evaluated to be a 2 based on 2.58 hours. A performance shaping factor of 2 indicates there is more than sufficient time to perform the action. The operator action has been reevaluated with the performance shaping factor evaluated as a 0. The resulting human error probability is 4.54E-03. The human error probability was reported in Reference 3 as 5.45E-03.***
OPRMU3	Operators provide borated makeup water to the RWST initially from the spent fuel pool, and in the long term, with makeup from service water following a medium LOCA.	2.67 hours	1.80 hours	No Impact	No Change 7.17E-03	Time difference equates to a decrease of 52.2 minutes. Timing difference is due to securing containment spray at CIB reset pressure. The performance shaping factor was previously evaluated to be 5. A performance shaping factor of 5 indicates there is enough time to perform the action at a normal pace and verify results. This time difference does not impact the human error probability.

ATTACHMENT 2: BVPS-2 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS						
Operator Action	**Action Description**	**Previous Post-EPU MAAP Timings**	**Revised Post-EPU MAAP Timings**	**Impact on Timing PSF**	**Post-EPU Human Error Probability**	**Basis For the Timing PSF Impact Determination**
OPROR1	Operators manually initiate recirculation mode of operation by starting the Recirculation Spray System (RSS) pumps, aligning power supplies to appropriate RSS equipment, resetting safety injection system, and verifying service water flow to RSS headers, following a small LOCA event.	9.5 hours	7.86 hours	No Impact	No Change 1.05E-03	Time difference equates to a decrease of 1.64 hours. Timing difference is due to securing containment spray at CIB reset pressure. The performance shaping factor was previously evaluated to be 0. A performance shaping factor of 0 indicates there is more than sufficient time to perform the action and to correct any significant errors. The operator action has been reevaluated with the new time and it is determined that there is no change in performance shaping factor or human error probability.
OPROR2	Operators manually initiate recirculation mode of operation by starting the RSS pumps, aligning power supplies to appropriate RSS equipment, resetting safety injection system, and verifying service water flow to RSS headers, following a large LOCA event.	N/A	1.13 hours	No Impact	No Change 2.12E-03	The previous timing was not based on MAAP. It was based on simplified thermal-hydraulic analyses that indicate a time of 0.77 hours to complete the action. The MAAP analyses indicate an increase in time available of 22 minutes. The performance shaping factor was evaluated as a 5, indicating adequate time to complete the action. This time difference does not impact the performance shaping factor or the human error probability.

ATTACHMENT 2: BVPS-2 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS						
Operator Action	**Action Description**	**Previous Post-EPU MAAP Timings**	**Revised Post-EPU MAAP Timings**	**Impact on Timing PSF**	**Post-EPU Human Error Probability**	**Basis For the Timing PSF Impact Determination**
OPROS2	Operator manually actuates safety injection and verifies operation of certain safety equipment on loss of both trains of SSPS due to actuation relay failure. On failure of manual safety injection actuation, the operator manually aligns the safety equipment. This event is following a small LOCA.	0.94 hours	0.93 hours	No Impact	No Change 1.33E-02	Time difference equates a decrease of less than 1 minute and is due to the surge line configuration error. The PSF was previously evaluated as a 2, which indicates more than sufficient time to complete the action. This time difference does not impact the performance shaping factor or human error probability.
OPROS3	Operator manually actuates safety injection and verifies operation of certain safety equipment on loss of both trains of SSPS due to actuation relay failure. On failure of manual safety injection actuation, the operator manually aligns the safety equipment; following a medium LOCA.	0.28 hours	0.29 hours	No Impact	No Change 1.71E-02	Time difference equates an increase of less than 1 minute and is due to the surge line configuration error. The performance shaping factor was previously evaluated to be a 3. A performance shaping factor of 3 indicates there is sufficient time to perform the action. This time difference does not impact the performance shaping factor or the human error probability.

ATTACHMENT 2: BVPS-2 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS						
Operator Action	**Action Description**	**Previous Post-EPU MAAP Timings**	**Revised Post-EPU MAAP Timings**	**Impact on Timing PSF**	**Post-EPU Human Error Probability**	**Basis For the Timing PSF Impact Determination**
OPRRE5	Reenergize the emergency buses 2AE and 2DF by closing OCB 85 and OCB 94 to energize transformers 2A and 2B, replacing one or more of the fast transfer breakers, then opening ACB 42C and ACB 342D, and closing ACB 42A and ACB 342B. May also use motor-operated disconnect switch for transformer 2A.	2.61 hours	2.62 hours	No Impact	No Change 8.67E-03	Time difference equates to a decrease of less than 1 minute and is due to the surge line configuration error. The performance shaping factor was previously evaluated to be a 3. A performance shaping factor of 3 indicates there is sufficient time to perform the action. This time difference does not impact the performance shaping factor or the human error probability.
OPRRE6	Reenergize the emergency buses 2AE and 2DF by closing OCB 85 and OCB 94 to energize transformers 2A and 2B, replacing one or more of the fast transfer breakers, then opening ACB 42C and ACB 342D, and closing ACB 42A and ACB 342B. May also use motor-operated disconnect switch for transformer 2A	0.79 hours[2]	0.73 hours	No Impact	No Change 6.12E-02	Time difference equates to a decrease of 3.6 minutes and is due to the surge line configuration error. The PSF was previously evaluated as an 8. A performance shaping factor of 8 indicates rapid action must be taken to complete the action successfully. This time difference does not impact the performance shaping factor or the human error probability.

ATTACHMENT 2: BVPS-2 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS

Operator Action	Action Description	Previous Post-EPU MAAP Timings	Revised Post-EPU MAAP Timings	Impact on Timing PSF	Post-EPU Human Error Probability	Basis For the Timing PSF Impact Determination
	following a transient induced small LOCA.					
OPRRED	Reenergize the emergency buses 2AE and 2DF by closing OCB 85 and OCB 94 to energize transformers 2A and 2B, then opening ACB 42C and ACB 342D, and closing ACB 42A and ACB 342B. May also use motor-operated disconnect switch for transformer 2A.	2.61 hours	2.62 hours	No Impact	No Change 5.93E-04	Time difference equates to a decrease of less than 1 minute and is due to the surge line configuration error. The performance shaping factor was previously evaluated to be a 3. A performance shaping factor of 3 indicates there is sufficient time to perform the action. This time difference does not impact the performance shaping factor or the human error probability.

ATTACHMENT 2: BVPS-2 OPERATOR ACTION TIMES USING SLIM IMPACTED BY THE MAAP RE-ANALYSIS						
Operator Action	**Action Description**	**Previous Post-EPU MAAP Timings**	**Revised Post-EPU MAAP Timings**	**Impact on Timing PSF**	**Post-EPU Human Error Probability**	**Basis For the Timing PSF Impact Determination**
OPRREE	Reenergize the emergency buses 2AE and 2DF by closing OCB 85 and OCB 94 to energize transformers 2A and 2B, then opening ACB 42C and ACB 342D, and closing ACB 42A and ACB 342B. May also use motor-operated disconnect switch for transformer 2A following a transient induced small LOCA.	0.79 hours[2]	0.73 hours	No Impact	No Change 3.23E-03	Time difference equates to a decrease of 3.6 minutes and is due to the surge line configuration error. The performance shaping factor was previously evaluated to be 5. A performance shaping factor of 5 indicates there is enough time to perform the action at a normal pace and verify results. This time difference does not impact the performance shaping factor or the human error probability.
OPRSL1	Operator identifies the ruptured steam generator, and isolates or verifies closed all flow paths to and from that steam generator, following an SGTR event.	1.6 hours	1.9 hours	No Impact	No Change 3.63E-03	Time difference equates to an increase of 0.3 hours and is due to the surge line configuration error. The performance shaping factor was previously evaluated to be 5. A performance shaping factor of 5 indicates there is enough time to perform the action at a normal pace and verify results. This time difference does not impact the PSF or the human error probability.

Notes:

1. The times reported for operator action OPRMU1 in Table 3-1 of L-05-140 (Reference 3) and operator action OPRMU2 in Table 3-7 of L-05-192 (Reference 2), were erroneously reported as 2.58 hours in the HRA MAAP analysis. The correct time between the SI cold leg recirculation and RWST depletion is 6.46 hours. See the response to RAI Question # 2.d of Reference 2 for further information.
2. The times reported for operator actions OPRRE6 and OPRREE in Table 10.16-2 of L-05-104 (Reference 4) were erroneously reported as 2.61 hours, but were evaluated using the correct time of 0.79 hours.