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2CAN081009

August 19, 2010

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Emergency License Amendment Request
Extension of ANO-2 Emergency Diesel Generator Allowed Outage Time
Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

Dear Sir or Madam:

Pursuant to 10 CFR 50.90 and 10 CFR 50.91(a)(5), Entergy Operations, Inc. (Entergy) hereby requests the following emergency amendment for Arkansas Nuclear One, Unit 2 (ANO-2). Currently, Technical Specification (TS) 3.8.1.1, "AC Sources", requires an inoperable Emergency Diesel Generator (EDG) to be restored to service within 14 days or actions to place the unit in a shutdown condition initiated. 2K-4B, the green-train EDG for ANO-2 was removed from service at 0330 CDT on August 9, 2010, to support preventative and corrective maintenance activities.

ANO's practice is that scheduled maintenance activities not exceed 50% of the TS allowable outage time (AOT). During post maintenance testing activities approximately mid-way through the current 14-day AOT, crankcase pressure (or vacuum) was found to be out-of-specification high. Prompt troubleshooting and adjustments, including evaluation by offsite experts brought to the site, have not succeeded in resolving the condition. Based on current information, the EDG will require extensive repair and testing to address the condition. However, the remaining AOT period is not sufficient to permit a significant repair of the engine in light of unforeseen circumstances that may arise; therefore, Entergy requests a one-time extension of the current 14-day AOT to not more than 18 days.

The current 14-day AOT expires at 0330 CDT, Monday, August 23, 2010. Absent approval of the requested AOT extension, ANO-2 will then be required to reach Mode 3 by 0930 CDT the same day and Mode 5 by 1530 CDT the following day. Approval of the AOT extension will permit ANO-2 to avoid unnecessary transition risks associated with a unit shutdown.

In accordance with 10 CFR 50.91(a)(5), where the Commission finds that an emergency situation exists, in that failure to act in a timely way would result in derating or shutdown of a nuclear power plant, or in prevention of either resumption of operation or of increase in power output up to the plant's licensed power level, it may issue a license amendment involving no

significant hazards consideration without prior notice and opportunity for a hearing or for public comment. Whenever an emergency situation exists, a licensee requesting an amendment must explain why this emergency situation occurred and why it could not avoid this situation. Based on the above information, the degraded crankcase vacuum condition was unexpected and could not have been foreseen. Without knowledge of this condition, appropriate planning to complete repairs and restore the EDG to an operable status within the current AOT was not possible. Therefore, Entergy believes the requirements for seeking this emergency request is justified.

An explanation of the proposed change is provided in Attachment 1. A markup of the affected TS page is contained in Attachment 2 of this submittal. A revised (clean) TS page is provided in Attachment 3.

Although Entergy requests approval based on a deterministic evaluation of the proposed change, risk insights have also been provided in Attachment 1. Attachments 4, 5, and 6 include specific cutsets supporting the risk evaluation.

The proposed change has been evaluated in accordance with 10 CFR 50.91(a)(1) using criteria in 10 CFR 50.92(c) and it has been determined that the changes involve no significant hazards consideration. The bases for these determinations are included in the attached submittal.

The proposed change does not include any new commitments.

Entergy requests approval of the proposed amendment by August 22, 2010. Once approved, the amendment shall be implemented without delay.

If you have any questions or require additional information, please contact Mark Giles at 479-858-4710.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 19, 2010.

Sincerely,

BLB/dbb

Attachments:

1. Analysis of Proposed Technical Specification Change
2. Proposed Technical Specification Changes (mark-up)
3. Proposed Technical Specification Changes (revised)
4. Base Case Top 25 CDF Cutsets With Descriptions
5. EDG 2K-4B Out of Service - Top 25 CDF Cutsets With Descriptions (Normal Weather)
6. EDG 2K-4B Out of Service - Top 25 CDF Cutsets With Descriptions (Severe Weather)

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Attachment 1

2CAN081009

Analysis of Proposed Technical Specification Change

1.0 DESCRIPTION

This letter is an emergency request to amend Operating License NPF-6 for Arkansas Nuclear One, Unit 2 (ANO-2).

The proposed change permits a one-time extension of the Technical Specification (TS) allowed outage time (AOT) of a single ANO-2 Emergency Diesel Generator (EDG) from 14 days to 18 days.

2.0 PROPOSED CHANGE

The proposed change will revise TS 3.8.1.1, "AC Sources," to permit the green-train EDG (2K-4B) to remain inoperable for an additional 4 days beyond its current 14-day AOT. This extension will be applied only to the current in-progress 2K-4B maintenance window. In order to support this one-time extension, the following Note 2 will be added, applicable to TS 3.8.1.1 Action b:

"The 14-day allowable outage time (AOT) may be extended to up to 18 days for 2K-4B only, applicable to the maintenance window beginning August 9, 2010. This footnote expires at 0330 CDT, August 27, 2010, or when 2K-4B is returned to an OPERABLE status, whichever is shorter."

Entergy proposes to maintain the 72-hour limitation of TS 3.8.1.1 Action b, Note 1, requiring the availability of the Alternate AC Diesel Generator (AACDG) while 2K-4B remains inoperable (see Section 3.0 below for further information). However, the proposed Note 2 will be applicable to the 14 days denoted in Note 1 in addition to being applicable to TS 3.8.1.1 Action b. Therefore, if the AACDG becomes inoperable at anytime prior to restoration of 2K-4B, either 2K-4B or the AACDG must be restored within 72 hours, not to exceed the proposed extended AOT period of 18 days.

A markup of the associated TS page is included in Attachment 2 of this submittal. A revised (clean) page is provided in Attachment 3.

3.0 BACKGROUND

ANO-2 is equipped with two seismically qualified, class 1E, EDGs which supply emergency electrical power to the 4160 V vital AC busses. Each engine is designed to automatically start and tie-on to its respective 4160 V engineered safety features (ESF) bus in the event of a bus under-voltage condition on either the 4160 V bus or its associated 480 V load center. The EDGs also receive an auto start command on an ESF signal, but will not load unless a bus under-voltage condition exists.

Each EDG is designed to start automatically upon receipt of a start demand, attain rated speed and voltage within 15 seconds, and sequentially accept ESF loads. Each ANO-2 EDG is sized to accommodate loads up to all anticipated ESF actuated equipment.

The EDGs are also designed for manual operation from either the local control panel or the control room operating panel. This provision allows operation for surveillance testing and manual start and load operations, as well as local operations in an event where the control room may be rendered inaccessible.

The EDGs are described in Chapter 8.3.1.1.9 of the ANO-2 Safety Analysis Report (SAR).

In addition to the EDGs, ANO has installed a diesel generator pursuant to the requirements of 10 CFR 50.63, Loss of All Alternating Current Power, paragraph (c)(2), Alternate AC Source. The AACDG is a 16 cylinder, four stroke, turbocharged, diesel engine driven generator rated at 4400 KW continuous output and 5320 KW overload. Its size is based on the capability to supply the licensing basis loss of offsite power (LOOP) loads of any one of the four vital buses, well in excess of that required to support its Station Blackout mission of 3100 KW. The AACDG is capable of supplying 4160 V power to ANO-1 vital buses A3 or A4, or ANO-2 vital buses 2A3 or 2A4. It can also supply non-vital 4160V buses A1 for ANO-1 or 2A1 for ANO-2. The buses can be supplied in any combination as long as the total load does not exceed the engine peak load rating. The design consideration for the AACDG assumed the engine would be started from the control room and available to power the safety buses within 10 minutes of the diagnosis of a station blackout condition. The 10-minute criterion is a bounding value from Section 3.2.5 of NRC Regulatory Guide (RG) 1.155, Station Blackout, and 10 CFR 50.63(c)(2) such that, if demonstrated, precludes the necessity for performing a specific coping analysis. The AACDG output was tied to an ANO-1 vital bus (A3) during startup program testing on March 22, 1995 and to an ANO-2 vital bus on October 11, 1995. These tests loaded the engine and measured voltage dip. During these tests, an actual blackout event was simulated and the time to energize the buses was recorded. In each case the time was less than the 10-minute criterion.

The AACDG is completely independent from off-site power and the EDGs. The AACDG, all support systems, and attendant electrical buses are housed in a dedicated building located outside the power block, inside the protected area fence. The AACDG is discussed in Section 8.3.3 of the ANO-2 SAR.

The AACDG is a non-Q, manually started and loaded alternate source of AC power. Operation and loading of the AACDG is possible from the ANO-2 control room or locally. All operations involving the AACDG are directed by procedure OP-2104.037. This procedure contains instructions for operating under various circumstances such as starting, loading, unloading, aligning to electrical buses, emergency starting/loading, and starting/loading with failure of both controlling computers. The procedure also contains instructions for the quarterly full load test and an 18-month test that verifies starting and loading in less than 10 minutes.

The ANO-2 EDG 2K-4B is currently inoperable. Prior to inoperability, the EDG's availability over the previous 12 months was 100%. The ongoing repair schedule of 2K-4B will result in a final availability of greater than 92% (rolling 12 months), even if the EDG remains inoperable for up to 29 days.

2K-4B was removed from service at 0330 CDT, August 9, 2010, in support of a 24-month outage to perform maintenance checks and correct known component deficiencies. During post maintenance testing (PMT) operations, engine crankcase vacuum was noted to be in the normal range, up to an engine load of approximately 2100 KW. When the engine approached

full load (2850 KW), engine vacuum degraded from a normal value of approximately -2.0" H₂O vacuum to 0" H₂O vacuum. All other engine and generator parameters remained at or near normal full load values.

Portions of the maintenance activities performed on 2K-4B during the 24-month outage involved components that create vacuum in the engine compartment. In general, these components were disassembled, inspected and cleaned to verify no degradation had occurred and to ensure these components would maintain high reliability. No significant issues were found with these vacuum components during initial inspection. Substantial investigations and checks were conducted which have led to a conclusion that the primary contributor to this condition is the crankcase oil separator.

This conclusion was supported through dedicated interaction with fleet engineers and maintenance experts. Applicable operating experience was also revisited. Two Fairbanks & Morse representatives are currently on site and have been assisting with failure mode evaluations, troubleshooting, and repair/restoration efforts. Currently, no evidence suggesting cylinder or piston damage (a repair activity that would take up to an additional two weeks) has been discovered.

Ongoing activities include replacing the oil separator that supplies crankcase gases to the eductor, which supports a minimal pressure environment in the crankcase. This is expected to require an additional 3 days of work. This activity, coupled with final restoration and testing activities, will leave little time before the end of the 14-day AOT is reached.

Based on the above and the remaining known activities, Entergy believes the EDG can be repaired and restored to an operable status with minimal need for additional time. Entergy requests a 4-day extension of the current AOT to affect repairs, perform PMT and operability testing, and to account for any unforeseen conditions that may occur during the repair and restoration process.

4.0 TECHNICAL ANALYSIS

As stated previously, correction of the 2K-4B crankcase vacuum-related condition involves a significant and complex maintenance procedure. Time is not only required to complete repair and restorative testing, but also to prepare for the unexpected maintenance activity. Based on the possible solutions, it is unlikely 2K-4B can be restored to an operable status prior to the expiration of the current 14-day AOT, which ends at 0330 CDT, August 23, 2010. Therefore, to avoid unnecessary transitional risks associated with a plant shutdown, Entergy requests a one-time extension of the current AOT of up to a total of 18 days. This period is expected to support 2K-4B restoration and accommodate any unforeseen circumstances that may arise during repair and restoration.

The current 14-day AOT associated with TS 3.8.1.1 Action 'b' requires several compensatory measures to remain in place until the affected EDG is restored to an operable status. Compensatory measures include the following:

1. The local area weather conditions were evaluated prior to entering the EDG AOT for voluntary planned maintenance. An extended EDG AOT (EDG outage lasting more than 72 hours) is not entered for voluntary planned maintenance purposes if weather forecasts for the local area are predicting severe weather conditions that could affect the switchyard or offsite power supply during the AOT period.
2. The condition of the switchyard, offsite power supply, and the grid were evaluated prior to entering the extended AOT for elective maintenance. An extended EDG AOT is not entered to perform elective maintenance when grid stress conditions are high such as during extreme summer temperatures and/or high demand.
3. No discretionary switchyard maintenance is allowed. In addition, no discretionary maintenance is allowed on the main, auxiliary, or startup transformers associated with the unit.
4. No maintenance or testing that affects the reliability of the ANO-2 train associated with the operable EDG is scheduled during the extended AOT. If any testing and maintenance activities must be performed while the extended AOT is in effect, a 10 CFR 50.65(a)(4) evaluation will be performed.
5. The Alternate AC Diesel Generator (AACDG) will be available as a backup to the inoperable EDG and will not be used for non-safety functions such as power peaking to the grid. After entering the extended AOT, the AACDG will be verified available every 8 hours and treated as protected equipment.
6. ANO-1 personnel will be notified to ensure no elective maintenance activities will be scheduled on the ANO-1 EDGs and will be made aware of the importance of the AACDG to ANO-2.
7. The steam driven emergency feedwater (EFW) pump will not be taken out of service for planned maintenance activities and will be treated as protected equipment.
8. The system dispatcher will be contacted once per day and informed of the EDG status, along with the power needs of the facility.
9. Should a severe weather warning be issued for the local area that could affect the switchyard or offsite power supply during the AOT, an operator will be available locally at the AACDG should local operation of the AACDG be required as a result of on-site weather-related damage.
10. ANO-2 on-shift Operations crews will discuss and review appropriate normal and emergency operating procedures upon or prior to assuming the watch for the first time after having scheduled days off while the AOT is in effect.
11. ANO-2 on-shift Operations crews will be briefed concerning the ANO-2 EDG activities, including compensatory measures established and the importance of promptly starting and aligning the AACDG following instruction of the ANO-2 Shift Manager upon a loss of offsite power event. This briefing will be performed upon or prior to assuming the watch for the first time after having scheduled days off while the AOT is in effect.

12. During the EDG outage, welding and transient combustibles will be controlled and continuous fire watch(es) established in the vicinity of the Turbine Building Switchgear (2A1/2A2/2A9).
13. During the EDG outage, welding and transient combustibles in the following areas will be controlled: the transformer yard; the south Switchgear Room (SS/2100-Z); the Cable Spreading Room (G/2098-L); Intake Structure (OO/IS); Diesel Corridor (JJ/2109-U); Lower South Electrical/Piping Penetration Room (EE/2055SC); and Electrical Equipment Room (TT/2108-S).
14. Prior to the EDG outage, the ANO-2 Operations personnel and ANO-1 fire brigade personnel are briefed on information related to fighting electrical fires and fires that may occur in the transformer yard. The briefing will include relevant industry operating experience related to fires in these areas and will also include a discussion of equipment restoration.
15. Prior to the EDG outage, the operability of the fire suppression in the transformer yard will be confirmed. This will be accomplished by verifying that surveillances are current and the system is not isolated. If the system is isolated, then fire hoses will be staged to the transformer yard area during the EDG maintenance outage.

The above compensatory measures were found acceptable by the NRC when ANO-2 adopted the current 14-day AOT. These compensatory measures are discussed in the TS Bases associated with TS 3.8.1.1 and in site implementing procedures. All of the above compensatory measures will remain in place during the requested AOT extension associated with this submittal.

Note 1 of TS 3.8.1.1 Action b requires availability of the AACDG when an EDG is removed from service. If the AACDG becomes unavailable (inoperable), then the allowable outage time is reduced to 72 hours from the time the AACDG becomes unavailable, not to exceed 14 days from the initial entry related to the inoperable EDG. Either the AACDG or the EDG may be restored within the 72 hours. If the EDG is restored, then TS 3.8.1.1, Action b is exited. If the AACDG is restored within the 72 hours, then restoration of the EDG must be accomplished within the initial 14 day AOT (i.e. 14 days from the time the EDG was initially declared inoperable and Action b was entered).

Entergy proposes to maintain the 72-hour limitation of Note 1 to TS 3.8.1.1 Action b. However, the proposed Note 2 (described in Section 2 above) will be applicable to the 14 days denoted in Note 1 in addition to being applicable to TS 3.8.1.1 Action b. Therefore, if the AACDG becomes inoperable at anytime prior to restoration of 2K-4B, either 2K-4B or the AACDG must be restored within 72 hours, not to exceed the proposed extended AOT period of 18 days.

The preceding information provides a deterministic basis supporting the acceptability of the extended EDG AOT. Substantial administrative controls and equipment protection measures have been established to limit the impact of the extended AOT. For additional information, the following risk insights are also provided.

An assessment of the change in the ANO-2 core damage frequency (CDF) due to allowing ANO-2 to continue at power operation beyond the TS restoration period of 14 days has been performed. A 4-day extension was evaluated to adequately bound the time that may be necessary to restore the green-train EDG system to an operable status.

In order to comply with the requirements of Regulatory Guide (RG) 1.177, "An Approach for Plant Specific, Risk-Informed Decisionmaking: Technical Specifications," for a risk-informed TS change, the following 3 tiers are considered.

Tier 1 is an evaluation of the impact on plant risk of the proposed TS change as expressed by the change in CDF, the incremental conditional core damage probability (ICCDP), and, when appropriate, the change in large early release frequency (LERF) and the incremental conditional large early release probability (ICLERP).

Tier 2 is an identification of potentially high-risk configurations that could exist if equipment in addition to that associated with the change were to be taken out of service simultaneously, or other risk-significant operational factors such as concurrent system or equipment testing were also involved.

Tier 3 is the establishment of an overall configuration risk management program to insure that other potentially lower probability, but nonetheless risk-significant, configurations resulting from maintenance and other operational activities are identified and compensated for.

The analysis of the risk impact of removing the green-train EDG from service for an additional 4 days is performed using the ANO-2 Equipment Out-of-Service (EOOS) Model 4p2. This model assumes zero test and maintenance (T&M) for the various systems modeled in the Probabilistic Risk Assessment (PRA). Since the issue affecting the green-train EDG was due to a Maintenance activity, it does not affect the red-train EDG and AACDG. However, common cause failures (CCF) for start failure were elevated to CCF values assuming failure of the remaining components. The ANO-2 LERF Model was used to calculate ICLERP. The duration of the extended green-train EDG maintenance was assumed to be 4 days.

Tier 1

Several ANO-2 EOOS calculations were performed:

The CDF values generated are provided in Table 1.

Table 1
Quantitative CDF Estimates

ANO-2 Case	CDF (/rx-yr)
Case 1 Baseline (zero maintenance)	6.94E-07
Case 1A Baseline (zero maintenance) with severe weather	1.67E-06
Case 2 2K-4B OOS with no severe weather	1.89E-06
Case 2A 2K-4B OOS with severe weather	7.71E-06
Delta CDF (Case 2) = $1.89\text{E-}6 - 6.94\text{E-}7$	1.20E-06
Delta CDF (Case 2A) = $7.71\text{E-}6 - 1.67\text{E-}7$	6.04E-06
Delta CDF, average assuming severe weather 25% of the time = $((1.2 \times 3 + 6.0 \times 4)/4) \times 1\text{E-}6$	2.41E-06

Using these results, the estimated change in the annual and the cycle average ANO-2 CDF for an additional 4 days of power operation while 2K-4B is OOS is provided in Table 2.

Table 2

ICCDP for Extension of 2K-4B OOS Period 4 Days Beyond AOT (with severe weather 25% of the time)	RG 1.177 ICCDP Guidance
$2.41\text{E-}06 \times 4/365 = \mathbf{2.64\text{E-}08}$	ICCDP less than $5\text{E-}7$
After doubling for External Events: $2 \times 2.64\text{E-}08 = \mathbf{5.28\text{E-}08}$	ICCDP less than $5\text{E-}7$

As noted in the table, the change in the ANO-2 ICCDP associated with allowing a one-time extension of the 2K-4B OOS time beyond its current 14-day AOT is below the RG 1.177 threshold.

LERF values corresponding to these CDF values could not be quantitatively calculated for severe weather. Prorating the above CDF results for LERF, the net impact on LERF results is below the RG 1.177 threshold for ICLERP because the ANO-2 baseline LERF is more than an order of magnitude lower than the ANO-2 baseline CDF.

External Events Risk – Fire

ANO-2 has recently developed a fire PRA model for NFPA-805 transition. However, turnover of this model to the PSA staff is not completed yet and, therefore, it could not be exercised in support of this application. Also, the ANO-2 NFPA 805 team is currently working on refining this model using recent industry pilot experience. It is judged that this model is not appropriate for the risk evaluation of this issue. Therefore, the ICCDP and ICLERP results were effectively doubled to account for external events including fire. The doubled results are still much lower than the RG 1.177 acceptance guidelines.

2K-4B is credited in the fire risk assessment for fire areas involving a loss of offsite power or 4.16 KV breakers and transformers that would cause an undervoltage on the 2A-4 (green-train) bus. Therefore, the qualitative risk of a fire is limited to fires in Fire Areas denoted in the list of compensatory measures near the beginning of Section 4.0 above. As discussed previously, hot work in these areas is being controlled and/or fire watches have been established in these areas until 2K-4B can be restored to an operable status in order to limit the likelihood and severity of any potential fires in these areas. These actions will reduce the fire risk for the proposed AOT extension.

External Events Risk – Seismic

ANO-2 has been designed to accommodate a safe-shutdown earthquake (SSE) with 0.2g peak ground acceleration (PGA). The seismic analysis performed in the IPEEE study for ANO-2 is based on the Seismic Margins Analysis (SMA) methodology as defined in NUREG-1407.

The seismic analysis methodology implemented for ANO-2 satisfied the NRC requirements for performing a seismic IPEEE as presented in Generic Letter (GL) 88-20, Supplement 4, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities." Seismic events were evaluated using the SMA method. The SMA methodology uses a deterministic approach to identify the weakest components in terms of High Confidence Low Probability of Failure (HCLPF) during peak ground acceleration. A seismic margin can be expressed in terms of the earthquake motion level that compromises plant safety. The seismic margin assessment determines whether there is high confidence that the plant can survive a given earthquake. No core damage frequency sequences were quantified as part of the IPEEE seismic risk analysis.

The seismic analysis concentrated on verifying the seismic adequacy of structures, equipment, large tanks, cable tray conduit raceway systems, and other distribution systems and relays. The screening and verification walk downs verified that the equipment, tanks, distribution systems, structures, and relays are able to withstand the 0.3g Review Level Earthquake at the plant and still provide for its safe shutdown. The HCLPF of the Emergency Cooling Pond (Dam and Reservoir) based on this review was estimated to be at least 0.5g. The containment structure was also evaluated seismically and it was determined that it has adequate strength and can be screened out.

For the proposed AOT extension, seismic delta risk is not expected to be a significant contributor, as there were no specific seismic vulnerabilities that were identified in this area.

Other External Hazards

The ANO-2 IPEEE submittal examined the below hazards in addition to seismic and fire risk.

- High winds
- External floods
- Nearby industrial and military facilities
- Toxic chemicals
- Aircraft crashes

No vulnerabilities were identified in these areas for ANO-2. No appreciable impact on the subject request is expected from these hazards.

Based on the above and for the purposes of this assessment, the external events risk is assumed to be equal to the value of the internal events risk, i.e. the internal events delta risk was conservatively doubled to account for external events.

Sensitivity Case

Due to the high ambient temperatures present during recent days in the region, another sensitivity case was performed increasing the grid instability factor to twice that as normal. The ICCDP value for this case was found to be 1.91E-08, which is also within the RG 1.177 acceptance guidelines.

Tier 2

ANO-2 is addressing the inoperable condition associated with the green-train EDG. As a result of this effort, no maintenance or testing that affects the reliability of the ANO-2 train associated with the operable EDG is scheduled during the extended AOT. If any testing and maintenance activities must be performed while the extended AOT is in effect, a 10 CFR 50.65(a)(4) evaluation will be performed.. No discretionary switchyard maintenance will be allowed during the period of the green-train EDG inoperable condition. The red-train EDG and its support systems are currently considered protected.

As previously stated, ANO has at its disposal an AACDG. ANO-2 is committed to ensuring the AACDG remains available and protected for the duration of the EDG out-of-service window in order to effectively reduce the associated risks involved. In addition, extra precautions in the form of compensatory measures have been identified to assure that sources of power are protected to the extent practical and that precautions are taken with regard to the steam-driven emergency feedwater pump. These precautions are discussed under the compensatory measures section of this document and should further reduce the risk of the AOT extension.

Tier 3

In 2008, ANO-2 performed a major revision (Rev. 4p2) of the ANO-2 PRA model in order to meet the RG 1.200, Rev. 1, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," standard. Also in 2008, an ANO-2 PRA Peer Review was performed on Revision 4p2 of the PSA model. The 2008 ANO-2 PRA Peer Review was a full-scope review of the Technical Elements of the internal events, at-power PRA.

The results of the peer review identified gaps to be addressed in order to ensure that the model fully complies with all of the requirements of the RG 1.200, Rev. 1 standard. Although gaps were identified, these gaps do not affect the ANO-2 PRA model in a manner that would change the outcome of the risk assessment performed as part of this submittal. The PRA is of sufficient quality to be used in assessing the risk of the TS change for the green-train EDG.

The risk of extending the TS AOT for the 2K-4B green-train EDG an additional 4 days is not considered significant and is well within the acceptance criteria defined in RG 1.177. Given the proposed compensatory measures, the evaluated risk of the extended AOT (although not required), and the avoidance of unnecessary shutdown transient risk, Entergy believes the proposed change is acceptable.

Conclusion

In accordance with 10 CFR 50.91(a)(5), where the Commission finds that an emergency situation exists, in that failure to act in a timely way would result in derating or shutdown of a nuclear power plant, or in prevention of either resumption of operation or of increase in power output up to the plant's licensed power level, it may issue a license amendment involving no significant hazards consideration without prior notice and opportunity for a hearing or for public comment. Whenever an emergency situation exists, a licensee requesting an amendment must explain why this emergency situation occurred and why it could not avoid this situation. Based on the above information, the degraded crankcase vacuum condition was unexpected and could not have been foreseen. Without knowledge of this condition, appropriate planning to complete repairs and restore the EDG to an operable status within the current AOT was not possible. Therefore, Entergy believes the requirements for seeking this emergency request is justified.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

A change is proposed to the Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specifications (TSs) to permit a one-time extension of the allowable outage time (AOT) for a single Emergency Diesel Generator (EDG) from 14 days to a total of 18 days. The following compensatory measures will remain effective until the green-train EDG 2K-4B is restored to an operable status or until ANO-2 is shutdown to Mode 5.

1. The local area weather conditions were evaluated prior to entering the EDG AOT for voluntary planned maintenance. An extended EDG AOT (EDG outage lasting more than 72 hours) is not entered for voluntary planned maintenance purposes if weather forecasts for the local area are predicting severe weather conditions that could affect the switchyard or offsite power supply during the AOT period.
2. The condition of the switchyard, offsite power supply, and the grid were evaluated prior to entering the extended AOT for elective maintenance. An extended EDG AOT is not entered to perform elective maintenance when grid stress conditions are high such as during extreme summer temperatures and/or high demand.
3. No discretionary switchyard maintenance is allowed. In addition, no discretionary maintenance is allowed on the main, auxiliary, or startup transformers associated with the unit.

4. No maintenance or testing that affects the reliability of the ANO-2 train associated with the operable EDG is scheduled during the extended AOT. If any testing and maintenance activities must be performed while the extended AOT is in effect, a 10 CFR 50.65(a)(4) evaluation will be performed.
5. The Alternate AC Diesel Generator (AACDG) will be available as a backup to the inoperable EDG and will not be used for non-safety functions such as power peaking to the grid. After entering the extended AOT, the AACDG will be verified available every 8 hours and treated as protected equipment.
6. ANO-1 personnel will be notified to ensure no elective maintenance activities will be scheduled on the ANO-1 EDGs and will be made aware of the importance of the AACDG to ANO-2.
7. The steam driven emergency feedwater (EFW) pump will not be taken out of service for planned maintenance activities and will be treated as protected equipment.
8. The system dispatcher will be contacted once per day and informed of the EDG status, along with the power needs of the facility.
9. Should a severe weather warning be issued for the local area that could affect the switchyard or offsite power supply during the AOT, an operator will be available locally at the AACDG should local operation of the AACDG be required as a result of on-site weather-related damage.
10. ANO-2 on-shift Operations crews will discuss and review appropriate normal and emergency operating procedures upon or prior to assuming the watch for the first time after having scheduled days off while the AOT is in effect.
11. ANO-2 on-shift Operations crews will be briefed concerning the ANO-2 EDG activities, including compensatory measures established and the importance of promptly starting and aligning the AACDG following instruction of the ANO-2 Shift Manager upon a loss of offsite power event. This briefing will be performed upon or prior to assuming the watch for the first time after having scheduled days off while the AOT is in effect.
12. During the EDG outage, welding and transient combustibles will be controlled and continuous fire watch(es) established in the vicinity of the Turbine Building Switchgear (2A1/2A2/2A9).
13. During the EDG outage, welding and transient combustibles in the following areas will be controlled: the transformer yard; the south Switchgear Room (SS/2100-Z); the Cable Spreading Room (G/2098-L); Intake Structure (OO/IS); Diesel Corridor (JJ/2109-U); Lower South Electrical/Piping Penetration Room (EE/2055SC); and Electrical Equipment Room (TT/2108-S).
14. Prior to the EDG outage, the ANO-2 Operations personnel and ANO-1 fire brigade personnel are briefed on information related to fighting electrical fires and fires that may occur in the transformer yard. The briefing will include relevant industry operating experience related to fires in these areas and will also include a discussion of equipment restoration.

15. Prior to the EDG outage, the operability of the fire suppression in the transformer yard will be confirmed. This will be accomplished by verifying that surveillances are current and the system is not isolated. If the system is isolated, then fire hoses will be staged to the transformer yard area during the EDG maintenance outage.

Note 1 of TS 3.8.1.1, AC Power, Action b, requires availability of the AACDG when an EDG is removed from service. If the AACDG becomes unavailable (inoperable), then the allowable outage time is reduced to 72 hours from the time the AACDG becomes unavailable, not to exceed 14 days from the initial entry related to the inoperable EDG. Either the AACDG or the EDG may be restored within the 72 hours. If the EDG is restored, then TS 3.8.1.1, Action b is exited. If the AACDG is restored within the 72 hours, then restoration of the EDG must be accomplished within the initial 14 day AOT (i.e. 14 days from the time the EDG was initially declared inoperable and Action b was entered).

Entergy proposes to maintain the 72-hour limitation of Note 1 to TS 3.8.1.1 Action b. However, the proposed Note 2 (which describes the proposed AOT extension from 14 days to 18 days) will be applicable to the 14 days denoted in Note 1 in addition to being applicable to TS 3.8.1.1 Action b. Therefore, if the AACDG becomes inoperable at anytime prior to restoration of 2K-4B, either 2K-4B or the AACDG must be restored within 72 hours, not to exceed the proposed extended AOT period of 18 days.

Entergy Operations, Inc. (Entergy) has evaluated whether or not a significant hazards consideration is involved with the proposed change by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

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

Response: No

The EDGs are backup AC power sources designed to power essential safety systems in the event of a loss of offsite power. Granting of this request will have no effect on accident probabilities since the EDGs are not considered accident initiators and no physical changes are being made to the plant which would impact accident probabilities.

The EDGs provide backup power to components that mitigate the consequences of accidents. The current TSs permit a single EDG to be considered inoperable for up to 14 days. The proposed request extends the current AOT for EDG 2K-4B one time to no more than a total of 18 days. The proposed change does not allow any other risk-significant equipment to be removed from service during this period. The proposed change does not affect any of the assumptions used in deterministic safety analysis. The results of these evaluations indicate that granting of this request will not adversely affect the consequences of an accident previously evaluated.

Therefore, this proposed change does not represent 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 does not involve a modification to the physical configuration of the plant (i.e., no new equipment will be installed) or change in the methods governing normal plant operation. The proposed change does not introduce a new accident initiator, accident precursor, or malfunction mechanism.

Therefore, this proposed change does not create the possibility of an accident or a different kind than previously evaluated.

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

Response: No

The proposed change does not significantly affect the TSs or TS Bases that support the deterministic analyses used to establish the margin of safety. The substantial administrative controls and protection of equipment important to safety provides a sufficient deterministic margin to safety during the extended EDG AOT period. Although not required, calculations performed to analyze the change in risk based on this request produced acceptable values.

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

5.2 Applicable Regulatory Requirements / Criteria

10 CFR 50, Appendix A, General Design Criterion (GDC) 17, requires two independent power sources. The proposed change will not alter ANO-2 compliance with the GDC, given the AOTs supported by the TSs. The one-time EDG AOT extension to 18 days does not change the requirement to restore the EDG to an operable status.

Therefore, 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) Issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

In conclusion, Entergy has determined that the proposed change does not require any exemptions or relief from regulatory requirements, other than the TS, and does not affect conformance with any GDC differently than described in the Safety Analysis Report (SAR).

6.0 ENVIRONMENTAL CONSIDERATION

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(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

Attachment 2

2CAN081009

Proposed Technical Specification Changes (mark-up)

ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

LIMITING CONDITION FOR OPERATION

- b. With one diesel generator of the above required A.C. electrical power source inoperable, perform the following:
 - 1. Demonstrate the OPERABILITY of both the offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter, and
 - 2. Demonstrate the OPERABILITY of the remaining OPERABLE diesel generator within 24 hours by:
 - i. Determining the OPERABLE diesel generator is not inoperable due to a common cause failure, or
 - ii. Perform Surveillance Requirement 4.8.1.1.2.a.4 unless:
 - a. The remaining diesel generator is currently in operation, or
 - b. The remaining diesel generator has been demonstrated OPERABLE within the previous 24 hours, and
 - 3. Restore the diesel generator to OPERABLE status within 14 days ([sSee Notes 1 and 2](#)) or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Note 1 - If the Alternate A.C. Diesel Generator (AACDG) is determined to be inoperable during this period, then a 72 hour restoration period is applicable until either the AACDG or the diesel generator is returned to operable status (not to exceed 14 days ([see Note 2](#)) from the initial diesel generator inoperability).

[Note 2 - The 14-day allowable outage time \(AOT\) may be extended to up to 18 days for 2K-4B only, applicable to the maintenance window beginning August 9, 2010. This footnote expires at 0330 CDT, August 27, 2010, or when 2K-4B is returned to an OPERABLE status, whichever is shorter.](#)

Attachment 3

2CAN081009

Proposed Technical Specification Changes (revised)

ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

LIMITING CONDITION FOR OPERATION

- b. With one diesel generator of the above required A.C. electrical power source inoperable, perform the following:
 - 1. Demonstrate the OPERABILITY of both the offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter, and
 - 2. Demonstrate the OPERABILITY of the remaining OPERABLE diesel generator within 24 hours by:
 - i. Determining the OPERABLE diesel generator is not inoperable due to a common cause failure, or
 - ii. Perform Surveillance Requirement 4.8.1.1.2.a.4 unless:
 - a. The remaining diesel generator is currently in operation, or
 - b. The remaining diesel generator has been demonstrated OPERABLE within the previous 24 hours, and
 - 3. Restore the diesel generator to OPERABLE status within 14 days (see Notes 1 and 2) or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Note 1 - If the Alternate A.C. Diesel Generator (AACDG) is determined to be inoperable during this period, then a 72 hour restoration period is applicable until either the AACDG or the diesel generator is returned to operable status (not to exceed 14 days (see Note 2) from the initial diesel generator inoperability).

Note 2 - The 14-day allowable outage time (AOT) may be extended to up to 18 days for 2K-4B only, applicable to the maintenance window beginning August 9, 2010. This footnote expires at 0330 CDT, August 27, 2010, or when 2K-4B is returned to an OPERABLE status, whichever is shorter.

Attachment 4

2CAN081009

Base Case Top 25 CDF Cutsets With Descriptions

Base Case Top 25 CDF Cutsets With Descriptions

#	Cutset Probability	Event Probability	Event	Description
1	2.70E-07	2.70E-07 1.00E+00	%RVR RVR	REACTOR VESSEL RUPTURE <IE> RVR SEQUENCE MARKER
2	2.97E-08	3.10E-04 7.99E-02 1.00E+00 1.00E+00 1.20E-03	%T7 STM2-2P4BM THF2RCPTRP TQX ZHF2RCPTRP	Total Loss of Service Water Flow <IE> 2P4B IN TEST & MAINTENANCE Failure to trip RCPs after loss of CCW TQX SEQUENCE MARKER Failure to trip reactor coolant pumps following loss of component cooling water
3	2.54E-08	4.91E-04 1.00E+00 5.18E-05	%IORV SX YCC2CSTRNM	INADVERTENT OPEN RELIEF VALVE <INITIATOR> SX SEQUENCE MARKER CCF CONT SUMP MOV5 (5649-1 AND 5650-2)
4	1.88E-08	3.50E-03 5.38E-05 1.00E-01 1.00E+00	%RA EMM2B5XXXX LHF2RCSDIP RX	STEAM GENERATOR TUBE RUPTURE ON SG-A (SGTR-A) <IE> 480V LC 2B5 SOURCE MODULE Operator Failure to Manually Open Valve in RCS Drop Leg Flow Path (inside CNMT) RX SEQUENCE MARKER
5	1.88E-08	3.50E-03 5.38E-05 1.00E-01 1.00E+00	%RA EMM2B5XXXX LHF2RCSDOP RX	STEAM GENERATOR TUBE RUPTURE ON SG-A (SGTR-A) <IE> 480V LC 2B5 SOURCE MODULE Operator Failure to Manually Open Valve in RCS Drop Leg Flow Path (outside CNMT) RX SEQUENCE MARKER
6	1.88E-08	3.50E-03 5.38E-05 1.00E-01 1.00E+00	%RB EMM2B6XXXX LHF2RCSDIP RX	STEAM GENERATOR TUBE RUPTURE ON SG-B (SGTR-B) <IE> 480V LC 2B6 SOURCE MODULE Operator Failure to Manually Open Valve in RCS Drop Leg Flow Path (inside CNMT) RX SEQUENCE MARKER
7	1.81E-08	3.50E-04 1.00E+00 5.18E-05	%RCP SX YCC2CSTRNM	RCP SEAL LOCA <INITIATOR> SX SEQUENCE MARKER CCF CONT SUMP MOV5 (5649-1 AND 5650-2)
8	1.73E-08	1.03E+00 2.00E-02 8.40E-07 1.00E+00	%T6 KHF2BORATP KRTMECH TK	REACTOR TRIP INITIATING EVENT <IE> OPERATOR FAILS TO INITIATE EMERGENCY BORATION FAILURE OF REACTOR TRIP (MECHANICAL) ATWS SEQUENCE MARKER

#	Cutset Probability	Event Probability	Event	Description
9	1.59E-08	3.07E-04 1.00E+00 5.18E-05	%S SX YCC2CSTRNM	SMALL BREAK LOCA <IE> SX SEQUENCE MARKER CCF CONT SUMP MOVS (5649-1 AND 5650-2)
10	1.48E-08	1.03E+00 1.00E+00 1.00E+00 1.00E+00 2.19E-04 2.19E-04 1.00E+00 1.00E+00 3.00E-01	%T6 @B- SGAPRESS @B- SGBPRESS DBT2DSCHGL ECC2309409 ECC2ABRKR QHF2SGSBOX TBF ZHF2SGSBOX	REACTOR TRIP INITIATING EVENT <IE> SG A Pressurized Condition SG B Pressurized Condition BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING COMMON CAUSE FAILURE OF BOTH NORMAL SUPPLY BREAKERS TO OPEN Breakers 152-112 and 212 fail to open CCF Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion TBF sequence flag
11	1.31E-08	2.48E-02 1.00E+00 1.00E+00 1.00E+00 2.97E-05 1.00E+00 1.00E+00 5.94E-02 3.00E-01	%T3 @B- SGAPRESS @B- SGBPRESS DBT2DSCHGL ECC23CCDGF QHF2SGSBOX TBF ZBL1RUNF ZHF2SGSBOX	Loss of Offsite Power <IE> SG A Pressurized Condition SG B Pressurized Condition BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING ALL 3 DIESELS (EDG1,2 AND AAC) COMMON CAUSE TO RUN Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion TBF sequence flag LOOP Recovery with 1 run failure and battery depletion after load shedding
12	8.09E-09	1.03E+00 6.55E-06 1.00E+00 1.00E+00 1.20E-03	%T6 SCC2RP4ABC THF2RCPTRP TQX ZHF2RCPTRP	REACTOR TRIP INITIATING EVENT <IE> SW PUMP COMMON CAUSE FAILURE TO RUN (3 OF 3) Failure to trip RCPs after loss of CCW TQX SEQUENCE MARKER Failure to trip reactor coolant pumps following loss of component cooling water

#	Cutset Probability	Event Probability	Event	Description
13	6.75E-09	2.48E-02	%T3	Loss of Offsite Power <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		8.84E-06	ECC23CCDGA	ALL 3 DIESELS (EDG1,2 AND AAC) COMMON CAUSE FAILURE TO START
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		1.03E-01	ZBL0RUNF	LOOP Recovery with 0 run failures and battery depletion after load shedding
14	6.64E-09	3.00E-01	ZHF2SGSBOX	
		2.48E-02	%T3	Loss of Offsite Power <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		8.69E-06	ECC2DGVEFS	CCF to Start of all 6 DG Exhaust Fans (2VEF-24A/B/C/D, 2VEF-17, 2VEF-18)
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
15	5.44E-09	1.03E-01	ZBL0RUNF	LOOP Recovery with 0 run failures and battery depletion after load shedding
		3.00E-01	ZHF2SGSBOX	
		4.91E-04	%IORV	INADVERTENT OPEN RELIEF VALVE <INITIATOR>
16	5.04E-09	1.11E-05	HCC23HPFTS	CCF OF ALL 3 HPSI PUMPS TO START
		1.00E+00	SU	SU SEQUENCE MARKER
		4.91E-04	%IORV	INADVERTENT OPEN RELIEF VALVE <INITIATOR>
16	5.04E-09	1.00E+00	SX	SX SEQUENCE MARKER
		1.03E-05	YCC2CTMSTR	CCF OF CONT SUMP STRAINERS TO PLUG

#	Cutset Probability	Event Probability	Event	Description
17	4.98E-09	1.03E+00	%T6	REACTOR TRIP INITIATING EVENT <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		1.00E+00	DHF2D32BAP	OPERATOR FAILS TO TRANSFER 2D32B TO ALTERNATE POWER SOURCE
		5.38E-05	EMM2B6XXXX	480V LC 2B6 SOURCE MODULE
		1.00E+00	FHF2MFWTRP	failure to restart tripped MFW pump
		1.00E+00	QHF22P75SP	Failure to establish flow to SGs from AFW
		1.00E+00	QHF2SGLCXP	Failure to manually open EFW discharge valves to S/G A or S/G B
		1.00E+00	TBF	TBF sequence flag
		9.00E-05	ZHF2C2-045	QHF22P75SP * QHF2SGLCLP (Battery depletion)
18	4.98E-09	1.03E+00	%T6	REACTOR TRIP INITIATING EVENT <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		1.00E+00	DHF2D32BCP	FAILURE TO ALIGN DC BUS 2D02 TO ALTERNATE CHARGER 2D32B
		5.38E-05	EMM2B6XXXX	480V LC 2B6 SOURCE MODULE
		1.00E+00	FHF2MFWTRP	failure to restart tripped MFW pump
		1.00E+00	QHF22P75SP	Failure to establish flow to SGs from AFW
		1.00E+00	QHF2SGLCXP	Failure to manually open EFW discharge valves to S/G A or S/G B
		1.00E+00	TBF	TBF sequence flag
		9.00E-05	ZHF2C2-045	QHF22P75SP * QHF2SGLCLP (Battery depletion)
19	3.88E-09	2.31E-01	%T1	Turbine Trip <IE>
		2.00E-02	KHF2BORATP	OPERATOR FAILS TO INITIATE EMERGENCY BORATION
		8.40E-07	KRTMECH	FAILURE OF REACTOR TRIP (MECHANICAL)
		1.00E+00	TK	ATWS SEQUENCE MARKER

#	Cutset Probability	Event Probability	Event	Description
20	3.88E-09	3.50E-04 1.11E-05 1.00E+00	%RCP HCC23HPFTS SU	RCP SEAL LOCA <INITIATOR> CCF OF ALL 3 HPSI PUMPS TO START SU SEQUENCE MARKER
21	3.66E-09	2.48E-02 1.00E+00 1.00E+00 1.00E+00 4.80E-06 1.00E+00 1.00E+00 1.03E-01 3.00E-01	%T3 @B- SGAPRESS @B- SGBPRESS DBT2DSCHGL ECC2DGVEFR QHF2SGSBOX TBF ZBL0RUNF ZHF2SGSBOX	Loss of Offsite Power <IE> SG A Pressurized Condition SG B Pressurized Condition BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING CCF to Run of all 6 DG Exhaust Fans (2VEF- 24A/B/C/D, 2VEF-17, 2VEF-18) Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion TBF sequence flag LOOP Recovery with 0 run failures and battery depletion after load shedding
22	3.59E-09	3.50E-04 1.00E+00 1.03E-05	%RCP SX YCC2CTMSTR	RCP SEAL LOCA <INITIATOR> SX SEQUENCE MARKER CCF OF CONT SUMP STRAINERS TO PLUG
23	3.50E-09	3.50E-03 1.00E+00 1.00E+00 1.00E+00 1.00E-06	%RA RBF RHF2RCSDEP THF2OTCLRP ZHF2C2-006	STEAM GENERATOR TUBE RUPTURE ON SG-A (SGTR-A) <IE> RBF SEQUENCE MARKER Failure to depressurize RCS using steam generators Failure to establish Once-Thru-Cooling after total loss of FW (SGTR case) RHF2RCSDEP * THF2OTCLRP
24	3.50E-09	3.50E-03 1.00E+00 1.00E+00 1.00E+00 1.00E-06	%RB RBF RHF2RCSDEP THF2OTCLRP ZHF2C2-006	STEAM GENERATOR TUBE RUPTURE ON SG-B (SGTR-B) <IE> RBF SEQUENCE MARKER Failure to depressurize RCS using steam generators Failure to establish Once-Thru-Cooling after total loss of FW (SGTR case) RHF2RCSDEP * THF2OTCLRP

#	Cutset Probability	Event Probability	Event	Description
25	3.42E-09	1.83E-03	%T13	LOSS OF AC BUS 2A4 <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-03	ECB2A112XD	4160V AC BKR 152-112 FAILS TO OPEN
		2.50E-03	ECB2A309XD	4160V AC BKR 152-309 FAILS TO TRIP
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.00E-01	ZHF2SGSBOX	

Attachment 5

2CAN081009

**EDG 2K-4B Out of Service - Top 25 CDF Cutsets With Descriptions
(Normal Weather)**

**EDG 2K-4B Out of Service - Top 25 CDF Cutsets With Descriptions
(Normal Weather)**

#	Cutset Probability	Event Prob	Event	Description
1	3.72E-07	3.10E-04 1.00E+00 1.00E+00 1.20E-03	%T7 THF2RCPTRP TQX ZHF2RCPTRP	Total Loss of Service Water Flow <IE> Failure to trip RCPs after loss of CCW TQX SEQUENCE MARKER Failure to trip reactor coolant pumps following loss of component cooling water
2	2.70E-07	2.70E-07 1.00E+00	%RVR RVR	REACTOR VESSEL RUPTURE <IE> RVR SEQUENCE MARKER
3	4.74E-08	2.48E-02 1.00E+00 1.00E+00 1.00E+00 1.49E-02 1.82E-02 1.00E+00 1.00E+00 1.00E+00 2.35E-02 3.00E-01	%T3 @B-SGAPRESS @B-SGBPRESS DBT2DSCHGL EDG2DG1XXF EDG2DGAACF ETM2DG2XXX QHF2SGSBOX TBF ZBL2RNNSW ZHF2SGSBOX	Loss of Offsite Power <IE> SG A Pressurized Condition SG B Pressurized Condition BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING 2DG1 FAILS TO RUN AFTER FIRST HOUR OF OPERATION DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION 2DG2 IN TEST OR MAINTENANCE Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion TBF sequence flag
4	3.10E-08	3.10E-04 1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E+00 1.00E-04	%T7 @B-SGAPRESS @B-SGBPRESS QHF22P75SP QHF2QCSTXP TBX ZHF2QCSTXP	Total Loss of Service Water Flow <IE> SG A Pressurized Condition SG B Pressurized Condition Failure to establish flow to SGs from AFW Failure to align EFW/AFW suction to Unit 2 CSTs on lo-lo level of T-41B TBX SEQUENCE MARKER Failure to align EFW/AFW suction to 2T-41B on low-low level in 2T-41A

#	Cutset Probability	Event Prob	Event	Description
5	2.76E-08	3.10E-04 8.91E-05 9.99E-01 1.00E+00	%T7 RSP20P32AG THF2RCSTRX TQX	Total Loss of Service Water Flow <IE> RCP-A SEAL LEAKAGE RCPs are tripped after loss of CCW (Compliment to THF2RCSTRP) TQX SEQUENCE MARKER
6	2.76E-08	3.10E-04 8.91E-05 9.99E-01 1.00E+00	%T7 RSP20P32BG THF2RCSTRX TQX	Total Loss of Service Water Flow <IE> RCP-B SEAL LEAKAGE RCPs are tripped after loss of CCW (Compliment to THF2RCSTRP) TQX SEQUENCE MARKER
7	2.76E-08	3.10E-04 8.91E-05 9.99E-01 1.00E+00	%T7 RSP20P32CG THF2RCSTRX TQX	Total Loss of Service Water Flow <IE> RCP-C SEAL LEAKAGE RCPs are tripped after loss of CCW (Compliment to THF2RCSTRP) TQX SEQUENCE MARKER
8	2.76E-08	3.10E-04 8.91E-05 9.99E-01 1.00E+00	%T7 RSP20P32DG THF2RCSTRX TQX	Total Loss of Service Water Flow <IE> RCP-D SEAL LEAKAGE RCPs are tripped after loss of CCW (Compliment to THF2RCSTRP) TQX SEQUENCE MARKER
9	2.54E-08	4.91E-04 1.00E+00 5.18E-05	%IORV SX YCC2CSTRNM	INADVERTENT OPEN RELIEF VALVE <INITIATOR> SX SEQUENCE MARKER CCF CONT SUMP MOVS (5649-1 AND 5650-2)
10	2.49E-08	2.48E-02 1.00E+00 1.00E+00 1.00E+00 1.49E-02 6.16E-03 1.00E+00 1.00E+00 1.00E+00 3.66E-02 3.00E-01	%T3 @B-SGAPRESS @B-SGBPRESS DBT2DSCHGL EDG2DG1XXF EDG2DGAACA ETM2DG2XXX QHF2SGSBOX TBF ZBL1RNNSW ZHF2SGSBOX	Loss of Offsite Power <IE> SG A Pressurized Condition SG B Pressurized Condition BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING 2DG1 FAILS TO RUN AFTER FIRST HOUR OF OPERATION DG AAC FAILS TO START ON DEMAND 2DG2 IN TEST OR MAINTENANCE Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion TBF sequence flag

#	Cutset Probability	Event Prob	Event	Description
11	2.37E-08	2.48E-02	%T3	Loss of Offsite Power <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		1.49E-02	EDG2DG1XXF	2DG1 FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		5.85E-03	EDG2DGAACL	DIESEL GENERATOR AAC FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.66E-02	ZBL1RNNSW	
		3.00E-01	ZHF2SGSBOX	
12	2.13E-08	2.48E-02	%T3	Loss of Offsite Power <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		4.31E-03	EDG2DG1XXL	2DG1 FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.66E-02	ZBL1RNNSW	
		3.00E-01	ZHF2SGSBOX	
13	1.88E-08	3.50E-03	%RA	STEAM GENERATOR TUBE RUPTURE ON SG-A (SGTR-A) <IE>
		5.38E-05	EMM2B5XXXX	480V LC 2B5 SOURCE MODULE
		1.00E-01	LHF2RCSDIP	Operator Failure to Manually Open Valve in RCS Drop Leg Flow Path (inside CNMT)
		1.00E+00	RX	RX SEQUENCE MARKER

#	Cutset Probability	Event Prob	Event	Description
14	1.88E-08	3.50E-03	%RA	STEAM GENERATOR TUBE RUPTURE ON SG-A (SGTR-A) <IE>
		5.38E-05	EMM2B5XXXX	480V LC 2B5 SOURCE MODULE
		1.00E-01	LHF2RCSDOP	Operator Failure to Manually Open Valve in RCS Drop Leg Flow Path (outside CNMT)
		1.00E+00	RX	RX SEQUENCE MARKER
15	1.88E-08	3.50E-03	%RB	STEAM GENERATOR TUBE RUPTURE ON SG-B (SGTR-B) <IE>
		5.38E-05	EMM2B6XXXX	480V LC 2B6 SOURCE MODULE
		1.00E-01	LHF2RCSDIP	Operator Failure to Manually Open Valve in RCS Drop Leg Flow Path (inside CNMT)
		1.00E+00	RX	RX SEQUENCE MARKER
16	1.83E-08	1.03E+00	%T6	REACTOR TRIP INITIATING EVENT <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.19E-04	ECC2ABRKR	Breakers 152-112 and 212 fail to open CCF
		1.49E-02	EDG2DG1XXF	2DG1 FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
17	1.81E-08	3.50E-04	%RCP	RCP SEAL LOCA <INITIATOR>
		1.00E+00	SX	SX SEQUENCE MARKER
		5.18E-05	YCC2CSTRNM	CCF CONT SUMP MOVS (5649-1 AND 5650-2)
18	1.73E-08	1.03E+00	%T6	REACTOR TRIP INITIATING EVENT <IE>
		2.00E-02	KHF2BORATP	OPERATOR FAILS TO INITIATE EMERGENCY BORATION
		8.40E-07	KRTMECH	FAILURE OF REACTOR TRIP (MECHANICAL)
		1.00E+00	TK	ATWS SEQUENCE MARKER
19	1.59E-08	3.07E-04	%S	SMALL BREAK LOCA <IE>
		1.00E+00	SX	SX SEQUENCE MARKER
		5.18E-05	YCC2CSTRNM	CCF CONT SUMP MOVS (5649-1 AND 5650-2)

#	Cutset Probability	Event Prob	Event	Description
20	1.48E-08	1.03E+00	%T6	REACTOR TRIP INITIATING EVENT <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.19E-04	ECC2309409	COMMON CAUSE FAILURE OF BOTH NORMAL SUPPLY BREAKERS TO OPEN
		2.19E-04	ECC2ABRKR	Breakers 152-112 and 212 fail to open CCF
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
21	1.27E-08	3.00E-01	ZHF2SGSBOX	
		2.48E-02	%T3	Loss of Offsite Power <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		4.31E-03	EDG2DG1XXL	2DG1 FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		6.16E-03	EDG2DGAACA	DG AAC FAILS TO START ON DEMAND
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		6.41E-02	ZBL0RNNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
22	1.24E-08	2.48E-02	%T3	Loss of Offsite Power <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-03	ECB2A308XD	4160V AC BKR 152-308 FAILS TO TRIP
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.66E-02	ZBL1RNNSW	
		3.00E-01	ZHF2SGSBOX	
23	1.24E-08	2.48E-02	%T3	Loss of Offsite Power <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-03	ECB2A309XD	4160V AC BKR 152-309 FAILS TO TRIP
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.66E-02	ZBL1RNNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
24	1.20E-08	2.48E-02	%T3	Loss of Offsite Power <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		4.31E-03	EDG2DG1XXL	2DG1 FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		5.85E-03	EDG2DGAACL	DIESEL GENERATOR AAC FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		6.41E-02	ZBL0RNNSW	
		3.00E-01	ZHF2SGSBOX	
25	1.19E-08	2.48E-02	%T3	Loss of Offsite Power <IE>
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-05	ECC23CCDGA	ALL 3 DIESELS (EDG1,2 AND AAC) COMMON CAUSE FAILURE TO START
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		6.41E-02	ZBL0RNNSW	
		3.00E-01	ZHF2SGSBOX	

Attachment 6

2CAN081009

**EDG 2K-4B Out of Service - Top 25 CDF Cutsets With Descriptions
(Severe Weather)**

**EDG 2K-4B Out of Service - Top 25 CDF Cutsets With Descriptions
(Severe Weather)**

#	Cutset Probability	Event Prob	Event	Description
1	5.91E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		1.49E-02	EDG2DG1XXF	2DG1 FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		1.47E-01	ZBL2RUNSW	
		3.00E-01	ZHF2SGSBOX	
2	3.72E-07	3.10E-04	%T7	Total Loss of Service Water Flow <IE>
		1.00E+00	THF2RCPTRP	Failure to trip RCPs after loss of CCW
		1.00E+00	TQX	TQX SEQUENCE MARKER
		1.20E-03	ZHF2RCPTRP	Failure to trip reactor coolant pumps following loss of component cooling water
3	3.04E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		1.49E-02	EDG2DG1XXF	2DG1 FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		6.16E-03	EDG2DGAACA	DG AAC FAILS TO START ON DEMAND
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
4	2.89E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		1.49E-02	EDG2DG1XXF	2DG1 FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		5.85E-03	EDG2DGAACL	DIESEL GENERATOR AAC FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	
5	2.70E-07	2.70E-07	%RVR	REACTOR VESSEL RUPTURE <IE>
		1.00E+00	RVR	RVR SEQUENCE MARKER
6	2.60E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		4.31E-03	EDG2DG1XXL	2DG1 FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
7	1.51E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-03	ECB2A308XD	4160V AC BKR 152-308 FAILS TO TRIP
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	
8	1.51E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-03	ECB2A309XD	4160V AC BKR 152-309 FAILS TO TRIP
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
9	1.50E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		4.31E-03	EDG2DG1XXL	2DG1 FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		6.16E-03	EDG2DGAACA	DG AAC FAILS TO START ON DEMAND
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.79E-01	ZBL0RUNSW	
		3.00E-01	ZHF2SGSBOX	
10	1.42E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		4.31E-03	EDG2DG1XXL	2DG1 FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		5.85E-03	EDG2DGAACL	DIESEL GENERATOR AAC FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.79E-01	ZBL0RUNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
11	1.41E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-05	ECC23CCDGA	ALL 3 DIESELS (EDG1,2 AND AAC) COMMON CAUSE FAILURE TO START
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.79E-01	ZBL0RUNSW	
		3.00E-01	ZHF2SGSBOX	
12	1.37E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		2.27E-03	EMM2DG1FXA	2DG1 FUEL XFER PUMP FAILS TO START <module>
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
13	1.23E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-03	ECB2A1001D	AC BREAKER 152-1001 FAILS TO CLOSE
		1.49E-02	EDG2DG1XXF	2DG1 FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	
14	1.01E-07	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		1.67E-03	EDG2DG1XXA	2DG1 FAILS TO START ON DEMAND
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
15	9.87E-08	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.97E-05	ECC23CCDGF	ALL 3 DIESELS (EDG1,2 AND AAC) COMMON CAUSE TO RUN
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	
16	9.85E-08	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		1.63E-03	ECC2CCFDGA	2DG1/2 COMMON CAUSE FAILURE TO START
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	
17	8.67E-08	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-03	ECB2A308XD	4160V AC BKR 152-308 FAILS TO TRIP
		6.16E-03	EDG2DGAACA	DG AAC FAILS TO START ON DEMAND
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.79E-01	ZBL0RUNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
18	8.67E-08	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-03	ECB2A309XD	4160V AC BKR 152-309 FAILS TO TRIP
		6.16E-03	EDG2DGAACA	DG AAC FAILS TO START ON DEMAND
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.79E-01	ZBL0RUNSW	
		3.00E-01	ZHF2SGSBOX	
19	8.24E-08	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-03	ECB2A308XD	4160V AC BKR 152-308 FAILS TO TRIP
		5.85E-03	EDG2DGAACL	DIESEL GENERATOR AAC FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.79E-01	ZBL0RUNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
20	8.24E-08	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-03	ECB2A309XD	4160V AC BKR 152-309 FAILS TO TRIP
		5.85E-03	EDG2DGAACL	DIESEL GENERATOR AAC FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.79E-01	ZBL0RUNSW	
		3.00E-01	ZHF2SGSBOX	
21	7.90E-08	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		6.16E-03	EDG2DGAACA	DG AAC FAILS TO START ON DEMAND
		2.27E-03	EMM2DG1FXA	2DG1 FUEL XFER PUMP FAILS TO START <module>
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.79E-01	ZBL0RUNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
22	7.50E-08	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		5.85E-03	EDG2DGAACL	DIESEL GENERATOR AAC FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		2.27E-03	EMM2DG1FXA	2DG1 FUEL XFER PUMP FAILS TO START <module>
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.79E-01	ZBL0RUNSW	
		3.00E-01	ZHF2SGSBOX	
23	6.47E-08	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.07E-03	SMM22P4AXA	SW PUMP 2P4A MODULE (ACTIVE FAULTS)
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	

#	Cutset Probability	Event Prob	Event	Description
24	6.09E-08	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		1.82E-02	EDG2DGAACF	DIESEL GENERATOR AAC FAILS TO RUN AFTER FIRST HOUR OF OPERATION
		1.01E-03	EMM2DG1SWC	2DG1 SERVICE WATER COOLING FAULT MODULE
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		2.23E-01	ZBL1RUNSW	
		3.00E-01	ZHF2SGSBOX	
25	6.07E-08	4.96E-02	%T3SW	LOSS OF OFFSITE POWER INITIATOR During Severe Weather
		1.00E+00	@B-SGAPRESS	SG A Pressurized Condition
		1.00E+00	@B-SGBPRESS	SG B Pressurized Condition
		1.00E+00	DBT2DSCHGL	BATTERY 2D11 OR 2D12 DISCHARGED IN 8 HOURS WITH LOAD SHEDDING
		2.50E-03	ECB2A1001D	AC BREAKER 152-1001 FAILS TO CLOSE
		4.31E-03	EDG2DG1XXL	2DG1 FAILS TO LOAD AND RUN DURING FIRST HOUR OF OPERATION
		1.00E+00	ETM2DG2XXX	2DG2 IN TEST OR MAINTENANCE
		1.00E+00	QHF2SGSBOX	Failure to manually control EFW flow to S/G A or S/G B after Battery Depletion
		1.00E+00	TBF	TBF sequence flag
		3.79E-01	ZBL0RUNSW	
		3.00E-01	ZHF2SGSBOX	