AmerGen
A PECO Energy/British Energy Company

AmerGen Energy Company, LLC
Three Mile Island Unit 1
Route 441 South, P.O. Box 480
Middletown, PA 17057
Phone: 717-944-7621

February 18, 2000
5928-00-20034

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

Dear Sir or Madam:

Subject: Three Mile Island, Unit 1 (TMI Unit 1)
Operating License No. DPR-50
Docket No. 50-289
Request for Additional Information [RAI] (TAC No. MA6312)
Technical Specification Change Request No. 283

This letter responds to the subject RAI regarding the TMI Unit 1 request to change the Bases for the degraded grid undervoltage setpoint tolerance from “as-left” to “as-found” and the associated increase in the frequency of surveillance for the undervoltage relay by decreasing the Technical Specification surveillance period from refueling to annually. The subject RAI also requests a copy of the referenced calculation supporting the TSCR; we are herewith supplying the text portion of the calculation, which otherwise includes thousands of pages of computer runs, as agreed upon by teleconference with the TMI-1 Project Manager, Mr. Timothy Colburn. The calculation and its associated references are available for your review and inspection, upon request. If further discussion or a meeting would be of benefit to the Staff reviewers, AmerGen would be pleased to accommodate such a request.

The attachment to this letter contains the AmerGen response to the Staff's questions contained in your transmittal of January 24, 2000, received on January 28, 2000, and which requested a response within 30 days of receipt. If you have any questions concerning this response letter please contact Mr. Gregory M. Gurican of Regulatory Engineering at TMI Unit 1 (717) 948-8753.

Very truly yours,

John B. Cotton

John B. Cotton
Vice President, TMI Unit 1

JBC/gmg

Enclosures

A001

cc: Administrator, NRC Region I – Hubert J. Miller
TMI-1 Senior Project Manager – Timothy G. Colburn
TMI-1 Senior Resident Inspector – Wayne L. Schmidt
File No.: 99096

5928-00-20034

AMERGEN ENERGY COMPANY, LLC.

(A PECO Energy/British Energy Company)

Three Mile Island Nuclear Station, Unit 1
Operating License No. DPR-50
Docket No. 50-289
Technical Specification Change Request (TSCR) No. 283
Request for Additional Information

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF DAUPHIN)

This response to the NRC Request for Additional Information dated January 24, 2000 is submitted in support of Licensee's request to change the Appendix A Technical Specifications of Operating License No. DPR-50 for the Three Mile Island Nuclear Station, Unit 1. As part of this response, a proposed change to the Updated FSAR is also included to replace that which was submitted with the original TSCR No. 283.

All statements contained in this submittal have been reviewed, and all such statements made and matters set forth therein are true and correct to the best of my knowledge.

AmerGen Energy Company, LLC

BY: John B Cotton
Vice President, TMI Unit 1

Sworn and subscribed before me this

18th day of FEBRUARY, 2000.

Debra S. Klick
Notary Public

Notarial Seal
Debra S. Klick, Notary Public
Londonderry Twp., Dauphin County
My Commission Expires July 4, 2002
Member, Pennsylvania Association of Notaries

5928-00-20034

ENCLOSURE

Response to Request For Additional Information
Operating License No. DPR-50
Docket No. 50-289

Technical Specification Change Request No. 283

Question

1a. *"Why wasn't a higher setpoint chosen that reflects the higher setpoint chosen that reflects the originally used higher switchyard voltage of 229.45 kV?"*

Response

A higher setpoint would result in separation from the grid at a higher grid voltage. As long as adequate voltage is maintained to safety related loads and the grid is available, it is preferable to remain on the grid. The setpoint was chosed to optimize offsite source availability while assuring adequate voltage to safety related loads.

The old calculation TDR 995, Revision 1, analyzed downstream equipment voltages and corresponding upstream grid voltages for ES bus voltages corresponding to the high and low ends of the tolerance band for the proposed nominal degraded voltage relay dropout setting of 3760 V. The high end of the band was taken to be 3774 V and the low end was taken to be 3740 V.

In TDR 995, Revision 1, Case 9 analyzed a single transformer feeding ES bus 1E, LOCA loads, and a voltage of 3741 V on Bus 1E. This corresponded to a grid voltage of 229.45 kV. In TDR 995, Revision 1, Case 8 analyzed a single transformer feeding ES bus 1E, LOCA loads and a voltage of 3774 V on Bus 1E. This corresponded to a grid voltage of 231 kV.

Case 8 was intended to determine the vulnerability for grid separation at the high end of the Degraded Voltage Relay tolerance band, since relay action could disconnect the offsite source at the voltages analyzed in that case. Case 8 determine that the corresponding grid voltage for this case was 231 kV. The TDR did not, however, determine the grid voltage corresponding to the relay maximum reset voltage, which would have resulted in a grid voltage considerably higher than 231 kV. Reset voltage is the appropriate parameter to analyze since the relay could drop out during motor starting transient associated with LOCA block loading. This analysis would have demonstrated an undesirable vulnerability to grid separation at voltages above 231 kV. For instance, a reset voltage 1% above the maximum dropout would have resulted in a grid voltage of approximately 1% high than analyzed in Case 8, or approximately 233 kV. This would have indicated a need for a lower dropout voltage and a correspondingly lower grid voltage associated with the minimum dropout. (Note: the treatment in TDR 995, Revision 1, while not appropriate by today's standards, was typical of calculations of this vintage.)

Calculation C-1101-700-E510 selected degraded voltage relay setpoints based on a proper consideration of both dropout and reset characteristics. In addition, it incorporated updated impedance and loading data that imposed additional challenges to the reset capability that were not recognized in TDR 995, Revision 1. Consequently, the grid voltages cited in TDR 995, Revision 1, are obsolete and inappropriate for current usage. As stated in the TSCR, the voltage chosen was a reasonable compromise between critical voltage (governed by minimum dropout) and reset voltage (governed by maximum reset).

Question

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Question

1b. *"Is the minimum switchyard voltage value of 232 kV quoted in your submittal the current minimum switchyard voltage that you are experiencing?"*

Response:

For the past two years through December, 1999, the switchyard voltage has been greater than 232 kV, 99.92% of the time. We analyze at two different minimum voltages depending on whether we are assuming one or two transformer operation. The "single contingency minimum expected voltage" used for two transformer analysis is currently 224.7 kV. Calculation C-1101-700-E510-010, Case 5, shows that ES bus voltage will recover and remain above the maximum degraded voltage relay reset setting of 3806 V (3810 V) for the limiting scenario of LOCA block load sequencing, with a switchyard voltage of 224.7 kV

The "minimum expected voltage" of 232 kV is used for single transformer analysis. This voltage is used to define the lower limit of the normal operating range, and is based on observation that voltages lower than this occurs less than 1% of the time. The switchyard voltage is monitored to verify that it is greater than 232 kV 99% of the time over a rolling two year period to ensure that the grid voltage meets the established plant design basis voltage criterion. Calculation C-1101-700-E510-010, Case 6, shows that ES bus voltage will recover and remain above the maximum degraded voltage relay reset setting of 3806 V (3824 V) for LOCA block load sequencing, with a switchyard voltage of 232 kV.

The occurrence of a LOCA during single transformer operation, and grid voltage below 232 kV, could result in grid separation. This was recognized in the SER for Amendment No. 159 to the Facility Operating License No. DPR-50, dated February 25, 1991, which concluded that a postulated accident coincident with single transformer operation and a degraded grid event was a combination of unrelated events with a very low probability of occurrence.

Question

1c. *"Does the use of the maximum pickup value make 229.45 kV an unsuitable switchyard voltage for analysis purposes?"*

Response:

Yes. (See discussion above).

Question

1d. *"What is the switchyard voltage relative to the maximum pickup value of 3806V?"*

Response:

The relationship between switchyard voltage and ES bus voltage depends on the auxiliary transformer(s) in service and auxiliary transformer 4 kV secondary winding loading. Loading consists of both BOP loads, and ES bus loads. Worst case ES bus voltage is experienced when Auxiliary Transformer 1A is supplying the entire 4 kV BOP load, as well as ES Bus 1E loads. The limiting scenario for grid separation has been determined to be the fast transfer of BOP loads to Auxiliary Transformer 1A during normal operation. For this case, compensatory measures have been implemented at a grid voltage of 232.4 kV, to limit BOP loading below the assumed maximum loading of 24.3 MVA during low grid voltage conditions, in order to successfully accomplish the automatic fast transfer. Case 3B shows that with a 4 kV BOP loading of 23,972 kVA, and a switchyard voltage of 232 kV, ES Bus 1E voltage will remain at, or recover to 3806 V.

Procedure 1203-41 has been revised to include a chart to show the acceptable BOP loading for various grid voltage. This fast transfer case was not analyzed in TDR 995, Revision 1. In addition, the bus duct impedance associated with Auxiliary Transformer 1A was determined to be higher than that used in TDR 995, Revision 1, thus creating more limiting analytical constraints. All other cases analyzed result in ES bus voltages greater than 3806 V for grid voltage of 232 kV.

Question

2a. *"Please clarify whether the reliance on manual operator action is in fact a new requirement under the current proposed amendment (TSCR No. 283) relative to degraded voltage protection."*

Response:

The reliance on operator action in Calculation C-1101-700-E510, Revision 1 (the basis for TSCR No. 283) was perceived to be greater than reliance in TDR 995, Revision 1 (the basis for the current Technical Specification). This was primarily due to actions required to improve voltage to the battery chargers, which were not analyzed in TDR 995 Revision 1. Also, although manual actions were cited in TDR 995, Revision 1, this was not explicitly stated in the safety evaluation accompanying TSCR No. 203.

Revision 2 of Calculation C-1101-700-E510 places considerably less reliance on operator actions than Revision 1, due to the availability of new test data for the battery chargers, plant modifications to improve voltage, and data from motor manufacturers demonstrating additional thermal margin. Revision 2 shows that no manual actions are required to support voltage to the battery chargers, and that all motors are able to operate for several hours without degradation, at the worst case voltage afforded by the degraded voltage relays.

Question

2b. *"Describe what specific compensatory actions are available to the operator to improve voltage."*

Response:

Procedure 1203-41, Low System (Grid) Voltage Follow-Up Actions details the compensatory actions that are available to improve voltage. These actions include:

- Notify the Transmission System Operator to determine status of the 230 kV System. The Transmission Operator in contact with PJM will coordinate measures to reconfigure the transmission system. These measures may include switching of bulk capacitors, utilizing the Load Tap Changer (LTC) on the TMI 500/230 kV autotransformer, and other regional bulk system reconfiguration options such as switching of other available bulk capacitors, adjustment of LTCs and voltage schedule adjustment where affective and available.
- Determine Balance of Plant (BOP) 4 kV Bus loading and reducing the number of operating Circulating Water Pumps.
- Reduce non-essential lighting, heating and ventilation loads.
- Reducing non-essential loading of ES buses
- Based on plant conditions reduce to four operating circulating water pumps and trip any non essential condensate, condensate booster, or heater drain pumps.

Question

2c. *"Have you quantified the voltage improvement each of these would provide? What is the improvement?"*

Response:

No. Procedure 1203-41 directs operators to shed load, as conditions permit until voltage recovers to a point where the alarms are no longer present. This voltage is adequate to supply all loads with adequate voltage for indefinite operation. If voltage cannot be sufficiently improved by improvement of switchyard voltage or load shedding, the procedure ultimately directs operators to place the affected bus(es) on the Diesel Generator, at which time bus voltage will return to nominal conditions.

Question

3a. *"Your submittal states that during the period of low voltage, DC system loads will be supplied by the batteries…for at least 2 hours under worst-case conditions. What is the voltage deficit to the battery chargers during this period?"*

Response:

The vendor (Nuclear Logistics Inc.) has demonstrated by test that the battery chargers will provide adequate performance with an input voltage of 385 V. The worst case voltage to any battery charger determined in Calculation C-1101-700-E510, Revision 2 is 405 V. Therefore, there is no voltage deficit to the battery chargers. The TSCR No. 283 proposed UFSAR changes on p. 8.2-3 will require revision to reflect that if a degraded grid condition persists that operator actions will only be required in order to assure adequate voltage to the NSR loads, rather than both the battery chargers and NSR loads. (See draft UFSAR replacement page – attached.)

Question

3b. *"Do the battery chargers have low voltage protection to shut themselves down and protect themselves from the low voltage condition, or might they be damaged by the low voltage?"*

Response:

The battery chargers will not shut down or be damaged from low voltage conditions, but they may stop producing output current if the voltage becomes too low. As noted above, the TMI Unit 1 battery chargers will continue to operate satisfactorily at the worst case voltages determined in the revised voltage regulation calculation.

Questions:

3c.,d. *"Have the batteries been sized for a scenario involving unavailability of the chargers?…if the batteries have been discharging for some period of time following a LOCA, will they have sufficient capacity to then trip and close circuit breakers…to transfer safety loads to the DGs?"*

Response:

Since the battery chargers have been demonstrated by test as being available, battery sizing for the scenario involving unavailability of the chargers is not applicable.

Question

4a. *"With regard to the AC motor-driven DG Fuel Pumps DF-P-1A/C,...in the short term following a LOCA. What is the voltage deficit to these motors during this period?"*

Response:

Calculation C-1101-700-E510-010, Revision 1, Case 4
DF-P-1A, 406V vs. 414V required (-1.9%).
DF-P-1C, 404V vs. 414V required (-2.4%).

Calculation C-1101-700-E510-010, Revision 2, Case 4
DF-P-1A, 406V vs. 414V required (-1.9%).
DF-P-1C, 404V vs. 414V required (-2.4%).

Question

4b. *In operating intermittently, do these motors start and stop as demanded, or do they run continuously but are intermittently loaded as fuel supply dictates?*

Response:

The motors start and stop as demanded. Under the conditions evaluated the diesel would be running under a no load condition with minimal fuel oil consumption. Operating data has shown with the diesel running at 50% load the fuel oil consumption is 1.75 gpm. At this fuel oil consumption rate the fuel oil pump would receive one demand to operate approximately every 45 minutes. The pump time to refill the tank is approximately 10 minutes.

Question

4c. *"If they start and stop as demanded, have you evaluated the effect of multiple starts on the motors (with the attendant inrush currents) under the less-than-desired minimum voltages?"*

Response:

The effect of multiple starts on the motors has not been evaluated. As noted under the response to 4.b above the motors are not expected to experience frequent multiple stops and starts. The demand is approximately one start per hour. Since the motors will not see frequent multiple start demand and the design provides redundant DC powered pumps, the specific evaluation cited by the query was not performed.

Question

5a. *"With regard to the Make-up Pump Gear Oil Pumps MU-P-4A/B/C your submittal states...not required for the MU pumps and ...HPI system to perform their ECCS function. What is the voltage deficit to these pumps?"*

Response:

Calculation C-1101-700-E510-010, Revision 1, Case 4
MU-P-4B, 405V vs. 414V required (-2.2%).
MU-P-4C, 403V vs. 414V required (-2.7%).

Calculation C-1101-700-E510-010, Revision 2, Case 4
MU-P-4B, 405V vs. 414V required (-2.2%).
MU-P-4C, 403V vs. 414V required (-2.7%).

Question

5b. *"Is their backup function limited to providing backup to the shaft driven pumps in case the shaft driven pumps fail; or do they also have another function, such as circulating oil prior to the shaft driven pumps attaining full speed?"*

Response:

Their backup function is limited to providing backup to the shaft driven pumps in case the shaft driven pumps fail.

Question

5c. *"If they (MU Pump – Gear Oil Pumps) have another function, discuss why this function is not necessary for reliable operation of the MU pumps and the HPI system to perform their ECCS function?"*

Response

The MU/HPI Pumps (MU-P-1A/B/C) are driven by a 1800 RPM motor through a gear drive unit at 6800 RPM. The gear drive unit is lubricated and cooled through an oil recirculation system. The gear drive oil system has redundant oil pumps MU-P-4 and MU-P-5. These pumps are identical positive displacement pumps with capacity of 7.7gpm at 1800 RPM. MU-P-4A/B/C are driven by an AC motor. MU-P-5 is driven from the gear drive low speed shaft (at 1800 RPM). MU-P-4 provides redundant capability which protects the gear drive unit in the case of the shaft driven pump failure.
The intent of the original design was to provide an additional level of redundancy. In the late 1980s, electrical design issues with MU-P-4A/B/C were identified. At that time, a decision was made to rely upon the gear drive pump exclusively. The operating procedure was revised to ensure that it was clear that MU-P-5 was required to be operable for the associated MU-P-1 to be operable for its ECCS function.

The shaft driven pumps MU-P-5A/B/C are not susceptible to any common mode failure. The MU pump oil systems for MU-P-1A, B & C are functionally and physically independent. MU-P-5 A,B,C alone can provide all of the required gear unit cooling and lubrication. The operation of MU-P-4A,B,C is not required for the MU pumps and the HPI system to perform its ECCS function.

Question

6a. *"Did you determine whether the safety equipment would start satisfactorily under the initial transient voltage conditions associated with an accident, utilizing the appropriate degraded voltage setpoint?*

Response:

The voltage corresponding to the degraded voltage relay minimum dropout setpoint (3727 V) is not an appropriate analytical constraint for the initial transient conditions associated with an accident because an event occurring with these conditions will inevitably result in grid separation due to failure of the relay to reset. Therefore, LOCA block load sequencing was analyzed in Calculation C-1101-700-E510-010, Revision 1 at the minimum grid voltages expected (224.7 kV for two transformer operation and 232 kV for single transformer operation).

Calculation C-1101-700-E510-010, Case 7, analyses voltage at MCCs for GL 89-10 MOVs during LOCA block load sequencing. This case is modeled in a similar manner to the single transformer block load sequencing case (Case 6) except ES Bus voltage is assumed to be at the minimum degraded voltage relay reset voltage (3756 V) at the end of sequencing (although the corresponding switchyard voltage (220.66 kV) associated with this ES bus voltage is not expected.) This voltage (3756 V) represents the lowest voltage that could occur on the ES bus without separation from the grid during sequencing. The results of Case 7 show that sequenced motors have ample starting voltage, thus demonstrating that block load sequencing may be successfully accomplished at any voltage afforded by the degraded voltage relays prior to grid separation. Starting a large motor with ES bus voltage between the degraded voltage relay maximum reset voltage (3806 V) and the minimum reset voltage (3756 V) may result in grid separation. Starting a large motor with ES bus voltage below 3756 V will result in a high probability of grid separation of the affected bus, and transfer to the diesel generator.

Question

6b. *"With regard to the safety equipment you identified as not receiving adequate steady state voltage under worst case conditions, have you determined whether it would start properly under these conditions?"*

Response

Calculation C-1101-700-E510-010, Case 4 is analyzed with the ES bus voltage assumed to be at the low end of the degraded voltage relay setting tolerance band (3727 V). The worst case load for Case 4 is AH-E-29A which receives 391 V or 85% of 460 V. Starting voltage criteria for NEMA motors is 80%, so even under starting inrush there is probably enough margin to start the motor. However, this would cause 4160 V ES bus voltage to dip below the dropout setting and cause separation of the bus from the grid. Also, under these conditions, the 92% 480 V bus voltage alarms will have been tripped prompting operators to improve voltage. In general, manual operator actions to improve voltage will take precedence over manually starting loads, so starting motors under the conditions postulated by Case 4 is not expected.

Question

7. *"Are these alarms (set at 92% of 460 V at the unit substation buses) set sufficiently high to alert operators to the potentially to the low voltage conditions you have identified for the near-term post LOCA?"*

Response:

The 92% voltage alarms on the 480 V buses will trip at a corresponding 4160 V ES voltage considerably above the voltage (3727 V) postulated by the near term post LOCA case (Case 4). Case 8 shows that 4160 V ES Bus 1D will be at 3865 V, and 4160 V ES bus 1E will be at 3860 V. The 92% alarms will afford adequate voltage to all loads in the post LOCA scenario. Calculation C-1101-700-E510-010, Revision 2, shows that, in the near term post LOCA (during which operator action is not taken credit for), all loads have adequate voltage to operate for at least several hours, until voltage is improved.

Question

8a. *"What indications are available to the operator to make low voltage operability calls on the offsite system during plant operation?*

Response:

The operators are provided with low voltage alarms on the 230 kV switchyard bus (234.4 kV), and the 480 V ES buses (423 V).

- The GPU Energy Transmission System Operator has an Energy Management System (EMS) alarm for the TMI switchyard at 232.4 kV. The PJM System Operator also has a TMI switchyard EMS Normal Low Limit Alarm at 232.4 kV and an EMS Emergency or Post Contingency Low Limit Alarm at 223.3 kV.

Question

8b. *"If an event occurs that results in tripping of the plant, the loss of voltage support to the switchyard in combination with the increased loading of the safety loads will likely result in lower safety bus voltages than is typically seen during power operation. The alarms on the 480 V unit substations will not necessarily alert the operators to such a condition prior to the trip. Do your operators have the ability to determine when switchyard and plant conditions during operation would result in insufficient post-trip event voltages?"*

Response:

The critical contingency voltage minimum expected voltage (currently 224.3 kV) relates to a post trip event. Calculation C-1101-700-E510-010, Revision 2, shows that the grid is available to start LOCA loads without risk of separation at a bounding switchyard voltage of 223.3 kV, with two transformers available.

The actual "operability limit" would depend on information relating to grid conditions that may not be available to the operators, including system transmission and generation outages, system transfers, etc. The PJM, switchyard, and, plant alarms provide indication of a distressed grid but are not intended to be used as grid availability (operability) alarms.

For single transformer operation, the TMI Unit 1 licensing basis recognizes that low grid voltage combined with a LOCA and single transformer operation is a low probability combination of events which could result in grid separation.

Question

8c. *"To what degree does the TMI-1 generator provide support to the switchyard?"*

Response:

During periods of high generator VAR output, TMI Unit 1 may be supporting voltage at the switchyard. The degree of support depends on the VAR output and grid conditions including availability of transmission and generation facilities, and system load flow. Generally, TMI-1 provides voltage support to the switchyard when the generator reactive output is greater than the Main Step-up Transformers reactive losses. The Main Step-up Transformer reactive losses are approximately 100 MVAR. During 1999, the TMI-1 Generator reactive output was greater than 100 MVAR lagging approximately 6.8% of the time.

In lieu of the TMI-1 generator supporting the switchyard, other measures are available to the Transmission System Operator to support the switchyard. These measures may include the following actions: (1.) switching of bulk capacitors located at the TMI 500 kV bus; (2.) using the Load Tap Changers (LTC) on the TMI 500/230 kV autotransformer; and, (3.) examining other regional bulk transmission system reconfiguration options, such as: the switching of other available bulk capacitors, adjustment of LTCs, and voltage schedule adjustment where effective and available.

Question

9. *"Will a plant trip result in an overcurrent condition on the DG?"*

Response:

No. During single transformer operation, the operating Diesel Generator will be running isolated from the grid, supplying one 4160 V ES bus. This occurs automatically on a Auxiliary Transformer trip in that the Class 1E Bus connected to the failed transformer does not transfer but it is automatically loaded onto the diesel generator.

ATTACHMENT

UFSAR page 8.2-3, revised.

The TMI-1 Plant Electrical Distribution system design will adequately protect the safety related electric equipment from loss of capability of redundant safety loads, their control circuitry and associated electrical components required for performing safety functions as a result of sustained degraded voltage from the offsite electric grid system.

Loss of voltage protection on the 4160 V safety buses is provided by three solid state instantaneous relays on each bus arranged in a two-out-of-three coincident logic scheme with a voltage setpoint 58 percent of nominal bus voltage and a time delay of 1.5 seconds. These relays will trip the safety bus feeder breaker, initiate load shedding, start the respective diesel generator and sound an annunciator in the main Control Room.

Degraded grid voltage protection on the 4160 V safety buses is provided by three additional relays on each bus arranged in a two-out-of-three coincident logic with a voltage setpoint 90.4 percent of nominal bus voltage, and a time delay of 10 seconds. These relays will trip the associated safety bus feeder breaker, initiate load shedding, start the diesel generator and sound an annunciator in the main Control Room. This second level undervoltage protection setpoint provides the necessary protection of 480 volt safety related electrical loads for the worst case electrical lineup and **loading during the initial stages of a design basis LOCA,** assuming a degraded grid condition, and one (1) auxiliary transformer in operation. **If the degraded grid condition persists, operators may be required to take manual action in response to the 480 V bus undervoltage alarms to restore voltage or to transfer to the standby Diesel Generators in order to assure adequate voltage to the** ~~Battery Chargers and other~~ NSR **loads**. The above revised undervoltage protection setpoint will result in an increased probability of separation of the remaining ES bus from the 230 kV system during a postulated accident coincident with maximum BOP loads, a single auxiliary transformer operation and a degraded grid event, while the offsite system is still capable of providing power to the plant. However, neither the accident nor the degraded grid alone results in any event-related electrical system transfers that would cause loss of an auxiliary transformer or the automatic transfer of loads. Accordingly, it is concluded that simultaneous occurrence of these unrelated events is a very low probability, and the intent of requiring an adequate level of undervoltage protection is maintained by the revised degraded voltage setpoint. Technical Specification Section 3.5.3 provides inspection and testing requirements for these relays and timers.

Additional undervoltage protection is provided by relays on the 480 V safety buses. These relays annunciate in the Control Room at approximately 92 percent of the nominal rating of the motors (460V) connected to these buses to alert the operators to a low voltage condition to allow time to shed unnecessary loads to restore voltage and preclude trips, if possible.