RESPONSE TO PUBLIC COMMENTS ON DOCKET ID NRC-2011-0013 PROPOSED GENERIC COMMUNICATIONS: DRAFT NRC REGULATORY ISSUE SUMMARY 2011-XX: ADEQUACY OF STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGE

On January 18, 2011, a Notice of Opportunity for Public Comment was published in the Federal Register to clarify the NRC staff's technical position on existing regulatory requirements and guidance for Degraded Voltage Relay (second level undervoltage protection) protection setting bases and Transmission Network/Offsite/Onsite station electric power system design bases. On February 23, 2011, a Notice was published in the Federal Register extending the comment period to March 19, 2011, based on the request from NEI (ADAMS Accession No. ML110330025). Comments were received from 14 organizations/individuals.

1. (1-7) Dominion Resources, Inc (ADAMS Accession No. ML110540357)	2. (8-31) Exelon Generation Company, LLC (ADAMS Accession No. ML110540358)	3. (32-39) Southern Nuclear Operating Company (ADAMS Accession No. ML110540360)	4. (40-45, 59-85 & 86-96) NEI 1776 I Street NW Washington, DC, 20006 (ADAMS Accession No. ML110810619)
5. (49-51) Jerry Nicely Self (ADAMS Accession No. ML110800530)	6. (52-58) Larry Nicholson Nextera (ADAMS Accession No. ML110800536)	7. (97-108) PPL Susquehanna, LLC (ADAMS Accession No. ML110830675)	8. (109-124) APS, Palo Verde Nuclear Generating Station (ADAMS Accession No. ML110820342)
9. (125-131) Nextera Energy (ADAMS Accession No. ML110820119)	10. (132) TVA (ADAMS Accession No. ML110840041)	11. (133-137)Progress Energy (ADAMS Accession No. ML110840040)	12. (138-139) STARS (ADAMS Accession No. ML110870916)
13. (140) Greg Reimers/ Diablo Canyon Email (ADAMS Accession No. ML112010028)	14. (141) Brian Wilson (ADAMS Accession No. ML110960076)		

The NRC staff's review and disposition of the comments are provided in the following Table.

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1.	SUMMARY OF ISSUES - 1. DVR Setting Design Calculations	Dominion Resources Services, Inc	Section DVR Setting Design *In this manner, the DVR ensures adequate operational (starting and running) voltage to all safety related equipment, independent of voltage controlling equipment external to the plant safety related electrical distribution system.* The approach could imply that the load(s) should start from the lowest DVR dropout setting. A specific example for illustration is as follows: If voltage is at the lowest possible value above dropout, starting a load will cause DVR dropout, but, since the new steady state voltage will be lower than the initial value, then DVR reset cannot occur. Many utilities use the ABB 27N with harmonic filter which has a minimum 0.5% reset. Thus, with a setting of 93.6% +/- 0.9%, dropout could be as low as 92.7%. However, for motors causing more than 0.5% voltage dip at initial start, even if the voltage at the beginning of the event was 93.2% and a load was started, then DVR will dropout and never reset	Disagree NRC Staff has the following clarification with this position. If the offsite power has adequate capacity and capability, any voltage just above the DVR setpoint must not separate the offsite power source from the safety bus when starting large motors. The grid voltage is expected to recover. The key point is that the voltage setting(s) selected must ensure that adequate voltage is available at the component terminal(s) to operate the most limiting component (s) at a

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			causing a separation. A clarification that allows evaluation of motor starting as well-as other conditions is: If the DVR could possibly not cause separation then the required safety functions must be performed successfully. Thus, depending on the design of the plant, a voltage value for beginning the event with all required starts could be determined by an iterative process.	plant during the most limiting design basis event. The offsite/onsite interface calculation must show that, with the grid at the lower limit of the normal operating range, voltage at the safety bus is always well above the degraded voltage setpoint for all design basis event loading conditions (normal, abnormal and accident conditions including anticipated operational occurrence). The safety related equipment should be protected from two types of low voltage issues: 1. Loss of voltage event which implies a sudden sharp voltage drop in grid system. Typically a nominal delay is allowed for relay actuation to separate onsite busses from the grid if voltage does not recover to normal operating band. 2. Degraded voltage event that postulates sustained low voltage conditions for several seconds and subsequent recovery to normal operating band. If the offsite power system does not recover to nominal operating conditions, it is preferable to separate from the source. The ABB relay with harmonic filter should be able to reset if the grid perturbation is limited to a short duration.
2.	SUMMARY OF ISSUES -- 2 . Offsite/Onsite Design Interface Calculations(page 7)	Dominion Resources Services, Inc	This section contains elements that are too prescriptive. Many analyses will show that the unit loads/sequences assessed for determination of DVR setpoint adequacy for equipment protection are the same as those for evaluating offsite power. Since evaluating offsite power always involves higher voltages, it is clear the equipment will function and providing terminal voltages for this equipment is bounded by DVR adequacy analysis. A clarification that helps frame adequate analysis is: If the DVR could initiate separation then offsite power is not operable. Using the example above when evaluating offsite power would require that the safety bus recover above 93.6%+0.9%+0.5% or 95% before the earliest time delay for the DVR expires. Since a reset also resets the time delay, multiple DVR drop outs could occur without separation during load sequencing. Also, since 92.7% was evaluated for equipment protection, evaluating 95% (used for offsite power evaluation) would require the two sequences be substantially different (2.3%) for the DVR adequacy evaluation (at 92.7%) to not be bounding for equipment evaluation. Thus, providing calculation detail to motor terminals for offsite power evaluation is unnecessary in many designs.	Disagree NRC Staff has the following clarification for this position. To meet GDC 17 requirements, the licensee must demonstrate capability to safely shut down the plant for all design basis events with the grid voltage at the lowest allowable value as afforded by the transmission system operator. The voltage studies done for evaluating offsite power/onsite power interface should use minimum expected voltage at the plant/grid interface node, demonstrating adequate voltage for starting and running of plant components during normal, abnormal and accident conditions. The expected plant loading at 100% power operation may be higher than accident loading. Hence the voltage drop in the plant auxiliary system will be higher for normal operating conditions. The DVR setpoint should be below the normal operating voltage of the plant to avoid multiple spurious actuations. A separate analysis may be needed for DVR setpoint. The comment implies that DVR setpoint overlaps with system voltage during normal operation. Calculation details to motor terminals are helpful in gaining margin between DVR

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				setpoint and normal grid operating voltages. To avoid spurious DVR actuation during normal plant operation and during load sequencing, the DVR setpoint should be lower than normal operating band for offsite power. This can be achieved by : 1) Specifying equipment for safety related applications to function at voltage levels well below the nominal bus voltage. 2) Reducing the onsite system impedance/voltage drop. This can be achieved by reducing the cable impedance for the limiting safety loads and tripping non-essential loads after unit trip.
3.	SUMMARY OF ISSUES -- 2 . Offsite/Onsite Design Interface Calculations(page 7)	Dominion Resources Services, Inc	Part a states: *This transmission owner/operator supplied voltage range should address all transmission network and plant system operating configurations and should also include voltage drop due to the bounding worst case transmission system contingency (transmission system contingencies include trip of the nuclear power unit).* Certainly the trip of the nuclear power unit must always be considered. However, the definition of the worst case transmission system contingency requires clarifying statements. Certainly some analyses are done using "strong grid" for fault analyses or "weak grid" for voltage analyses. These modeled sources have a number of contingencies built into them. Voltage drop from the loss of the unit can vary considerably with system conditions. Arguments can be made that the worst case contingency (if different than the nuclear power unit) should only be considered once it has occurred. However, a key question should be applied: Is the contingency of interest monitored? If the status is not monitored, then how would the nuclear unit know when to apply the contingency? Thus, if the status of a key transmission line to the nuclear unit switchyard is known, either by instrumentation at the plant or timely notification by the grid operator, then the contingencies need only be considered when applicable. When evaluating voltage drop, most situations which cause meaningful changes are nearby and can be monitored.	Disagree The plant electrical distribution system should be designed based on the grid voltage range including the bounding worst case grid contingency (strong or weak grid depending on which one is bounding). In this way, the plant's design ensures adequate voltage to plant equipment as long as grid is operating as "expected". Contingencies that are beyond design basis (line outages during peak grid loading conditions) that occur during plant operation should be evaluated uniquely to assess the capability of offsite power to provide shutdown capability post trip as required by GDC 17. GDC 17 requires that offsite power has sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of *anticipated operational occurrences,* and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of *postulated accidents*.
4.	SUMMARY OF ISSUES -- 2 . Offsite/Onsite Design Interface Calculations(page 8)	Dominion Resources Services, Inc	Part c states: *For multi-unit stations, a separate analysis should be performed for each unit assuming (1) an accident in the unit being analyzed and simultaneous shutdown of all other units at the station,' or (2) an anticipated transient (anticipated operational occurrence) in the unit being analyzed (e.g., unit trip) and simultaneous shutdown of all other units at that station, whichever presents the largest load situation.*	

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			This requires clarification as an accident or anticipated transient both require unit trip. The word used for other units at the station is "shutdown" which is more orderly and takes more time. Simultaneous unit trip results in bigger voltage drops from VAR support (not loading). This is because VARs are local. System X/R is typically -50 so it is 50 times more difficult to move a VAR a hundred miles than a watt. Thus, most analyses show the worst voltage drop for the loss of the nuclear unit is when all of the nearby units (any type of generation) are already off. Changing that to tripping all units at the same time increases the voltage drop because grid compensatory actions are not included. Even a small (minute) time difference between losses of units can be meaningful in the voltage result. However, if the intent of the wording was simultaneous trip, then this is a special case of item 3 above, which is likely a monitored contingency.	Disagree This statement is consistent with GDC 17, GL 79-36, and IEEE Standard 308-1971, "Class IE Electrical Systems," Section 8, "Multi-Unit Station Considerations. Multi-unit sites have been licensed in accordance with above documents and should therefore evaluate the plants according to their licensing basis.
5.	SUMMARY OF ISSUES -- 2 . Offsite/Onsite Design Interface Calculations(page 8)	Dominion Resources Services, Inc	Part j states: *To provide assurance that actions taken to assure adequate voltage levels for safety related loads do not result in excessive voltages, assuming the maximum expected value of voltage at the connection to the offsite circuit, a determination should be made of the maximum voltage expected at the terminals of all safety related equipment and their starting circuits (if applicable).* If *this voltage exceeds the maximum voltage rating of any safety related equipment, immediate remedial action should be taken.* The word "immediate" describing remedial action should be removed from this section. Immediate remedial action could imply control room intervention. The control room has alarm procedures to address high voltage should it occur. Timeliness of remedial actions depends on how high actual voltage is since minor incursions have only long term implications for most equipment. Analyses of high grid voltage with light plant load are standard and provide insights as to what grid voltage upper limit should be or what compensating activities might be required for light load operations (refueling). In those cases where unit trip can result in a step increase in grid voltage (most common on higher voltage connections like 765kv), anticipated excursions above desired voltages should be addressed by compensating measures (changing excitation for nearby units, switching in reactor banks, etc.).	Disagree The wording is consistent with GL 79-36. The Offsite/Onsite design should address all grid operating conditions to prevent overvoltages from occurring. The point here is that if a design problem is identified such as overvoltage conditions, immediate actions need to be taken (compensatory and/or permanent design changes) to address the design problem rather than taking actions after it occurs.
6.	SUMMARY OF ISSUES (top of page 6)	Dominion Resources Services, Inc	States: *This interface calculation establishes operating voltage bands for all plant electrical buses, which ensures that all plant components and systems (Class 1E and Non Safety Related) have proper voltage for starting and running in all operational configurations (expected operational and accident conditions).* This statement needs clarification in that not all non-safety load voltages need to be evaluated. Typically, large motors (like reactor coolant pumps) need to be evaluated for starting impact on the safety bus. However, once a motor is found to be	Agree

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			small enough to not impact safety bus operation, further evaluation is unnecessary. The statement in the RIS can easily be interpreted as requiring evaluation of all non-safety loads down to the lowest levels of distribution.	The reference to 'non-safety related' is being removed. However, non-safety related loads need to be modeled to the extent that their operation can affect safety bus/equipment voltage.
7.	SUMMARY OF ISSUES - 1. DVR Setting Design Calculations (page 6)	Dominion Resources Services, Inc	*States:* *Licensee voltage calculations should provide the basis for their DVR settings, ensuring safety related equipment is supplied with adequate operating voltage (typically a minimum of 0.9per unit voltage at the terminals of the safety related equipment per equipment manufacturers requirements), based on bounding conditions for the most limiting safety related load (in terms of voltage) in the plant.* Clarification that voltages other than 90% voltage are common based on detailed plant analysis should be added. As an example, motors below 90% voltage continue to have plenty of margin in torque but may encroach on long time thermal limits. However, unless a motor is fully into its service factor (typically 1.15), as well as below 90% voltage, operation will be acceptable.	Agree. 90% was mentioned as an example used for illustration. The voltage values are plant-specific. Evaluations like mentioned in this comment could be acceptable as long as there is adequate engineering justification. Ensuring that voltages are within nominal limits greatly simplifies the analysis required.
8.	General Background - Pages 2 and 3	Exelon Generation Company, LLC	General Comments: The RIS uses terms such as "LVR (loss-of-voltage relay) voltage setting," "DVR (degraded voltage relay) settings" and "DVR dropout setting" without clarifying the intent or highlighting the differences. IEEE 741-2006, Annex A (Reference 1), has a discussion on the tolerances to be considered and recommends following ANSI/ISA 67.04.01 (Reference 2) treating the voltage relays and associated time delays as instruments. For the DVR, one example might be represented as follows: *Analytical limit:* Minimum voltage that assures actuation of the relay *Allowable value, Lower:* Higher than analytical limit to allow for drift and test equipment tolerance; abbreviated AVDO. Tech Spec value. *Dropout setpoint:* Lower voltage band of nominal setpoint. Abbreviated SPc DO (Setpoint calculated Drop Out) *Pickup setpoint:* Upper voltage band of nominal setpoint. Abbreviated SPc PU (Setpoint calculated Pick Up) *Allowable value, Upper:* Higher than SPc PU to allow for drift and test equipment tolerance; abbreviated AVPU. Tech Spec value. *Maximum Dropout:* Highest voltage that relay could actuate. Only importance is for establishing reset voltage.	Disagree. The terminology used in the RIS is consistent with the guidance documents. The setpoint accuracies and methodologies are beyond the scope of this RIS.

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			Maximum Pickup: The voltage required to assure DVR resets. The RIS states that two sets of calculations are required. It appears that at least three (3) distinctly different calculations are required (four if the site has different DVR time delays for accident and normal conditions). These would be at different bus voltage values. The "degraded voltage relaying design calculations" would be a load flow performed at the DVR analytical limit; the "plant voltage analysis" would be load flows and motor starting performed at the minimum transmission contingency voltage with an acceptance criterion of greater than relay maximum pickup (the voltage where DVR reset is assured) at the bus where the degraded voltage relays are connected (generally the medium voltage bus where the Emergency Diesel Generator is connected); finally, the evaluation of protective device actuation would be performed at the analytical limit of the loss of voltage relay setting comparing the motor running current to the thermal damage curve and protective device characteristic curve. Page 2, criteria b) - Some approved DVR designs sense and trip at an emergency bus level, and take advantage of inherent redundancy of the emergency buses. It should be an owner's option with respect to coincident logic. Change the "shall" to "may." Page 2/3 - The listed 6 criteria are good for setting the DVR. Early correspondence of the issue also included a second function for the DVR in that the design should minimize the effects of spuriously disconnecting the offsite sources. Although criteria b) and c)(2) are intended to add robustness to the design, a few sentences should be added to the discussion to accentuate the point.	The point of the RIS was to highlight that the DVR setting and design interface calculations have different requirements. The staff agrees that there are other calculations required to demonstrate the electrical system design basis. RIS is consistent with the NRC letter dated June 2, 1977. The coincident logic is to ensure that spurious or inadvertent separation of a reliable offsite power source. The redundancy of the safety buses alone does not address the above concern Current wording seems adequate to address the point that spurious trips of offsite power should be precluded by the design.
9.	SUMMARY OF ISSUES - 1. Degraded Voltage Relaying Design Calculations (page 6)	Exelon Generation Company, LLC	Under "Degraded Voltage Relaying Design Calculations," the RIS states in part "During normal plant operation, the Class 1 E safety related buses should automatically separate from the power supply within a short interval (typically less than 60 seconds) if sustained degraded voltage conditions are detected." Branch Technical Position PSB-1 clause B.1.b.2 included provisions for operator manual actions to restore bus voltage on the Class 1 E distribution system. The sixty second time delay would not allow operator actions. This appears to be a new NRC position.	Disagree. This is not a new requirement. RIS will be revised to remove the reference to auto separate in 60 secs. The 60 seconds time delay was identified as an example to illustrate that the time delay chosen for the sustained degraded condition (DVR settings) should be short to ensure that permanently connected Class 1E loads are not damaged. However, it should be noted that when voltage alarms occur, (alarm setpoint is set higher than the DVR setpoint), the grid voltage at that point may be well below the normal operating values and is approaching the DVR setpoint and operator actions may be taken to improve the voltage conditions to prevent separation from offsite power. The time delay chosen must ensure that until the relay automatic action is initiated, all Class 1E equipment are protected. The licensee must provide the bases and justification in support of the actual delay chosen.

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10.	SUMMARY OF ISSUES - 1. Degraded Voltage Relaying Design Calculations Page 6	Exelon Generation Company, LLC	The next to last sentence under item 1 states: 'The staff considers degraded voltage conditions coincident with a postulated design basis accident to be a credible event. The event is credible in that it has occurred previously (although nonaccident). It is acknowledged that safety loads combined with loss of generator reactive power support will cause a decrease in bus voltage. However, if the plant is operated within the bounds of the operating procedures (which are reflected in the voltage regulation calculations as described under the subsequent section), then the Class 1 E equipment should not experience a degraded voltage condition. The sentence can be removed without diminishing the need for the DVR, or without changing the intent of this section.	Disagree. The point being made in the RIS is that setting of the DVR requires consideration of a coincident accident in that the time delay chosen for the DVR must support the accident analysis assumptions in accordance with the NRC1977 letter. Operating a plant within allowable voltage range should minimize the potential for degraded voltage conditions on 1E busses. However, grid perturbations cannot be predicted. Hence the need for automatic protection.
11.	SUMMARY OF ISSUES – 1. Degraded Voltage Relaying Design Calculations - Page 6,	Exelon Generation Company, LLC	DVR Setting Design Calculations - Add a sentence "The model should utilize loads on the plant distribution system consistent with the specific transient or accident being analyzed."	Agree. The suggested sentence will be added to the RIS.
12	SUMMARY OF ISSUES – 1. Degraded Voltage Relaying Design Calculations - Page 6,	Exelon Generation Company, LLC	In addition, Branch Technical Position (BTP) PSB-1 clause B. 1 .b.2 (Reference 4) included provisions for operator manual actions to restore bus voltage on the Class 1 E distribution system. The RIS specifically excludes manual load shedding under the Offsite/Onsite Design Interface Calculations whereas the BTP allows for manual actions to avoid separation from offsite power. Please clarify if manual actions taken to restore voltages now require prior NRC approval.	Disagree All actions required to protect the Class 1E equipment from degraded voltage must be automatic and in accordance with 10 CFR 50.55 (a) (h). Manual actions are allowed as stated in PSB-1, B.1.b.2 for improving the voltage in response to the alarm in control room that alerted the operator to the degraded condition. However, to demonstrate the adequacy of onsite/offsite interface design and offsite power capacity and capability, as specified in GL 79-36, manual load shedding should not be assumed. The point at which operability of Class 1E equipment cannot be assured, protective actions should be automatic
13	SUMMARY OF ISSUES – 1. Degraded Voltage Relaying Design Calculations - Page 6,	Exelon Generation Company, LLC	Under "DVR Setting Design Calculations," the RIS states in part "...would allow calculation of voltages at terminals or contacts of all safety related equipment with the voltage at the DVR monitored bus at the DVR dropout setting." It is not clear what "contacts" are in this context. It is assumed that the concern is motor control center contactors and/or motor starting control circuits.	Agree RIS will be revised to just state “terminals” and not “Contacts”.
14	SUMMARY OF ISSUES – 1. Degraded Voltage Relaying Design Calculations - Page 6,	Exelon Generation Company, LLC	Under discussion of DVR setting calculations, the RIS states that setting cannot cause any degradation of the safety related components, including actuation of their protective devices. The BTP only stated damage to normally operating safety related equipment. The RIS language seems broader then BTP and appears to open up the position that the DVR studies have to consider starting of loads under non-accident conditions.	Disagree The DVR ensures that voltage requirements of the Class 1E loads are always preserved for operating the equipment under accident and non accident conditions including all abnormal operational occurrences.
15	SUMMARY OF ISSUES – 1. Degraded Voltage Relaying Design Calculations - Page 6,	Exelon Generation Company, LLC	The DVR time delay seems to be considering operation down to LVR setting for evaluations. However, there is no discussion on LVR setting considerations in any original requirements or the RIS. Under Guidelines for Voltage Drop Calculations, the summary states that the plant voltage analysis, while supplied from the transmission network, should be based on the operating voltage range of the transmission network connection. Grid operating voltage ranges do not allow operation down to levels that would cause sustained operation at LVR levels.	Disagree. The point is that the DVR setting is based on the voltage requirements of the equipment which should equate to voltages on the grid well below normal. It is understood that grid operating procedures should prevent sustained voltages at such low levels but regardless of what happens on the grid the DVRs will preserve the voltage limits for the equipment. Plant operation at LVR setpoint is not

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			Therefore, consideration for operation at the LVR setpoint would be inconsistent with this guidance. The condition that occurred at Arkansas Nuclear One (ANO) in 1978 would appear to be related to inadequate operating procedures and a lack of a rigorous analysis of the AC power distribution system. It would not be credible for present day operation. In addition, the operator would be alerted by an alarm on degraded voltage conditions (less than the analytical limit) as required by Branch Technical Position PSB- B.l.b.1.	expected and is not within the scope of the RIS.
16 (17 not used)	SUMMARY OF ISSUES – 1. DVR Setting Design Calculations - Page 6	Exelon Generation Company, LLC	In Section "DVR Setting Design Calculation" reference is made to 0.9 per unit voltage for adequate operating voltage. This would only apply for the most part to rotating equipment (motors). Motor Control Center (MCC) contactors, battery chargers, Motor Operated Valves (MOVs) all have less than a 90% operating voltage requirement. This distinction should be made and/or clarified.	Agree. 0.9 per unit voltage was mentioned as an example and was not meant to cover everything. RIS will be revised to delete references to specific numbers and emphasize voltage requirements and voltage requirements are plant-specific.
18	SUMMARY OF ISSUES – 1. DVR Setting Design Calculations - Page 6	Exelon Generation Company, LLC	The Degraded Voltage Relaying Design Calculations section should include a statement to emphasize that only steady state loading and steady state acceptable voltages at the class IE equipment are to be considered in determining the DVR drop out settings including the allowable tolerances. The paragraph does mention 0.9 per unit voltages at the terminals which is steady state but a positive statement about steady state loading and steady state acceptable voltages would be helpful. Also, there are alternatives to the 90% terminal voltage criterion. The concern is heating, causing a temperature rise, which decreases useful life of the insulation. Inspectors may read too much into the 90% criterion; a motor loaded to less than nameplate will draw less than service factor current at a lower terminal voltage. Therefore, a lower voltage would prove adequate as long as adequate torque is available.	Agree. 0.9 per unit voltage was mentioned as an example and was not meant to cover everything. RIS will be revised to delete references to specific numbers and emphasize voltage requirements and voltage requirements are plant-specific. The suggested analysis may be acceptable if properly developed and supported in the design. The 90% voltage criteria may not be adequate for certain components such as SOVs, motor control center contactors, etc.
19	SUMMARY OF ISSUES – 1. DVR Setting Design Calculations - Page 6	Exelon Generation Company, LLC	MOVs are not steady state loads. MOVs have traditionally been considered transient loads and, therefore, not included in the steady state voltage analysis. GL 89-10 (Reference 3) programs perform these calculations. A statement in this section that MOVs loads are not to be considered in this calculation will be helpful if NRC agrees with this interpretation	Disagree. MOVs should be addressed specifically and the DVR settings must support adequate voltages for all Class 1E equipment including MOVs.
20	SUMMARY OF ISSUES – 1. DVR Setting Design Calculations - Page 6	Exelon Generation Company, LLC	The starting voltage requirement is unclear. Some sites have evaluated the capability of starting each required safety related motor individually at the degraded voltage analytical limit. Other sites use a "block start analysis" where multiple motors are started simultaneously on the offsite source. There have been violations associated with both approaches. The RIS should describe an acceptable methodology for determination of motor starting voltage adequacy.	Disagree. The intent of the RIS is not to prescribe DVR relay setpoint methodology for every plant. The RIS provides the conditions for which plant specific analyses should be performed. The specific design of the plant dictates the type of analyses required to demonstrate adequacy of DVR setting. If the plant design requires load sequencing on the offsite source, then individual motor start is the appropriate methodology. If the plant design requires block starting accident loads, then the DVR setpoint should be based on multiple motor starts.
21	SUMMARY OF ISSUES – 1. DVR Setting Design	Exelon Generation Company, LLC	The RIS implies this portion of the calculations require that the licensee demonstrate that all class IE motors can be started with the voltages just above the analytical limit of the DVR	Disagree NRC staff disagrees with the interpretation. The staff agrees that a grid voltage 'freeze' corresponding to the DVR setpoint and a

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	Calculations - Page 6		setpoint. However, with voltage just above the DVR drop out value, any load addition (starting or running) will result in separating from the offsite source if no credit for external voltage controlling equipment is taken. Therefore, the purpose of this requirement is not clear. The intent of the starting voltage evaluation should be clarified. Some stations have evaluated the performance of protective devices during degraded grid conditions by mechanisms other than calculations (e.g., technical evaluations or computations). It is suggested that the NRC add a statement for acceptability of the same.	subsequent motor start will eventually separate the plant from offsite source as the voltage will not recover to reset the DVR. The 1977 NRC letter states that "voltage and time setpoints shall be determined from an analysis of the voltage requirements of the safety related loads". Safety related (Class 1E) equipment, particularly large motors, have starting and running "voltage requirements". When grid voltages are degraded (such as resulting in Class 1E bus voltages down close to where DVRs are set based on Class 1E equipment requirements), and the grid does not automatically recover, separation from the grid is appropriate. The DVR is expected to *reset after a perturbation of sustained duration* when automatic actions such as clearing the grid 'fault' that resulted in degraded voltage conditions. The NRC staff will accept standard industry practices to evaluate performance capabilities of DVR. Analyses supported by calculation should clearly and succinctly define plant design basis and compliance with regulation.
22	SUMMARY OF ISSUES – 1. DVR Setting Design Calculations - Page 6	Exelon Generation Company, LLC	Under Offsite/Onsite Design Interface Calculations, Guidelines for voltage drop calculations item 2, i), the acceptance criteria for demonstrating voltage adequacy would appear to be DVR Maximum Pickup (the voltage required to assure relay reset) and not component level voltage values.	Agree. RIS Section 2 (i) will be modified to state: *For each case evaluated, the calculated voltages on each safety bus should demonstrate adequate voltage at the safety bus and down to the component level.* It is based on Class 1E component terminal voltage requirements.
23	SUMMARY OF ISSUES – 2. Offsite/Onsite Design Interface Calculations	Exelon Generation Company, LLC	Item 2 (Offsite/Onsite Design Interface calculations) appears to be additional requirements for those sites licensed to the Standard Review Plan (NUREG 0800) Chapter 8 Appendix A Branch Technical Position PSB-1, "Adequacy of Station Electric Distribution System Voltages."	Disagree RIS highlights the guidelines provided in GL 79-36 and NUREG 0800, Chapter 8 Appendix A Branch Technical Position PSB-1, "Adequacy of Station Electric Distribution System Voltages.". There are no new requirements
24	SUMMARY OF ISSUES – 2. Offsite/Onsite Design Interface Calculations	Exelon Generation Company, LLC	Page 7- The phrase "...all operating configurations of transmission network and plant systems..." appears in a few sentences. The station interface agreement with the transmission provider integrates the considerations among the transmission network, the operability of the off site sources, and the voltage regulation (drop) calculations. The calculations identify certain controlling parameters for the transmission network. These controlling parameters are then incorporated into the Bases for the operability of the offsite source(s). If the plant configuration or transmission network parameters are not bounded by the calculations, then the operability of the offsite sources needs to be examined. In most cases, the plant operator has no control over the "configuration" of the transmission network, but does have agreements with the transmission system operator that normal operating voltages and post unit trip contingency voltages are controlled within established bounds. Add a few	Disagree. This is addressed in RIS Section 2 a. As discussed in GL2006-02 "Grid Reliability and Impact on Plant Risk and the Operability of Offsite Power", licensees are required to provide the transmission system operator (TSO), the operating voltage parameters required by the plant during all modes of operation. The analyses discussed in this comment should be the bases for the information provided to the TSO. The DVR protects the safety related equipment when a perturbation in the grid system results in degraded voltage

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			sentences detailing that the intent of the phrase "all operating conditions of the transmission network" means that the controlling parameters from the transmission network that are used in the calculations are consistent with those utilized in the Bases for operability of the offsite sources.	conditions and the normal operating parameters cannot be restored immediately to protect safety related equipment. The DVR setpoint evaluation requires a separate analysis.
25	SUMMARY OF ISSUES – 2. Offsite/Onsite Design Interface Calculations	Exelon Generation Company, LLC	Page 7, item a) - Change the last sentence to read "... include voltage drop due to all transmission system contingencies that are a direct result of the transient or accident being analyzed (typically this will include tripping of the nuclear power unit)."	Disagree. A transient grid perturbation may be a result in a plant trip. The DVR setpoint should be based on bounding voltage resulting from a transient grid condition. The actual reason for the perturbation is not a consideration. A plant trip may result in limiting conditions for DVR setpoint calculation.
26	SUMMARY OF ISSUES – 2. Offsite/Onsite Design Interface Calculations	Exelon Generation Company, LLC	Page 7, item a) - Either add to a) or add another section immediately after a). "The transmission system controlling parameters are assumed to remain unchanged throughout the initial stages of the event with the exception of those effects resulting from the event (contingency due to the loss of the unit). For purposes of the calculation, the Unit trip contingency can be coincident with the accident, or at a later time consistent with the assumptions in the plant accident sequence analyses."	Agree. RIS will be revised to state a): *The unit trip grid contingency voltage drop value should be used in the accident cases in accordance with the plant accident analyses since a unit trip occurs with an accident.*
27	SUMMARY OF ISSUES – 2. Offsite/Onsite Design Interface Calculations	Exelon Generation Company, LLC	Page 7, item b) - Delete the tabulation of sources of power to the emergency buses and replace with a simple statement of "all credited sources of offsite power to the emergency buses."	Disagree. The recommendation does not change the intent of the tabulation. To maintain consistency with GL 79-36, it is preferable to maintain the tabulation.
28	SUMMARY OF ISSUES – 2. Offsite/Onsite Design Interface Calculations	Exelon Generation Company, LLC	Page 8, item c) - Change to read: "...(1) an accident in the unit being analyzed and shutdown of all other units at the station consistent with the licensing basis of the station; ... in the unit being analyzed (e.g., unit trip) and shutdown of all other units at that station consistent with the licensing basis of the station, whichever represents the largest load situation." Typically, the licensing basis for multi-units site allow for an orderly shutdown of the unit not being analyzed, and do not require a "simultaneous" shutdown.	Disagree. The RIS is consistent with GL 79-36. The licensing basis of multi-unit sites has to be uniquely considered.
29	SUMMARY OF ISSUES – 2. Offsite/Onsite Design Interface Calculations	Exelon Generation Company, LLC	It is recommended that the NRC provide a positive statement for allowing the credit for voltage controlling equipment external to the class IE equipment for this calculation. Licensees perform LOCA load sequencing under this section of the calculations and take credit for LTCs (or other voltage regulating devices) to demonstrate the adequacy of the offsite sources. In addition, please clarify if MOVs are to be modeled during this scenario, even though it appears from the RIS that MOVs and other equipment like contactors are to be evaluated with voltages obtained from the Degraded Voltage Relaying Design Calculations with voltage just above the lowest set point of DGV relays.	Disagree. Use of LTCs is acceptable for regulating voltage during normal plant operation. LTCs do not afford protection during a transient degraded voltage condition that can affect operation of redundant equipment. The following changes will be incorporated in the RIS: Add the following in section 2 (general) and d. *All actions the electric power system is designed to automatically initiate or control should be assumed to occur as designed (e.g., automatic bulk or sequential loading or automatic transfers of bulk loads from one transformer to another, automatic starts of components, operation of automatic voltage controlling equipment, etc.,)*

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				Yes. All equipment including MOVs, contactors, solenoids, etc., must be evaluated for adequate voltage based on the DVR set point.
30	SUMMARY OF ISSUES – 2. Offsite/Onsite Design Interface Calculations	Exelon Generation Company, LLC	Under Item a), for units with LTCs, please clarify if the analysis is to be performed with the grid at minimum expected voltage, maximum expected voltage, or at both.	Disagree See Question 29. Analyses for normal operation should evaluate effect of LTC operation at the extreme settings for impact on operating equipment. DVR setpoint should be based on minimum voltage required for operation of accident mitigation loads. For units with LTCs, it is unlikely that voltage correction can be achieved within the short time it takes for contactors to drop out or fuses to blow during a sustained degraded voltage or overvoltage condition.
31	General	Exelon Generation Company, LLC	In general the clarifications contained in the draft RIS appear to be more restrictive and prescriptive than the cited historical regulatory documentation, and do not support plant unique design and current licensing bases that have been developed and accepted in previous licensing activities. Unique design and licensing bases that have previously been accepted and approved that may not be strictly aligned with the clarifications in the draft RIS may include use of an inverse time under voltage relay set between the DVR and LVR relays (such as .875 to 0.70 PU for a maximum of 60 seconds). Some sites may not provide coincident logic to preclude spurious trips; rather, the logic may include alternate design features to conform to the intent of the requirements of BTP PSB-1.	Disagree. Unique designs that may have been previously 'accepted' should have appropriate justification with NRC approval of the licensing documents. Typically, detailed calculations have not been reviewed as part of Technical Specification changes. The staff has relied on licensee correspondence stating adequacy of DVR setpoint to approve license amendment requests. Onsite inspections are used to verify analytical methods used to meet regulations. Alternate methods used to demonstrate conformance may be acceptable provided they meet the intent of BTP PSB-1 to protect safety related equipment
32	General	Southern Nuclear Operating Company	Include a definition of key terms (ex. Normal grid operation, sustained degraded voltage)	Agree Additional clarifications will be provided in the RIS wherever appropriate.
33	General	Southern Nuclear Operating Company	The RIS does not address completely the specific requirements in the PSB-1 (ADAMS Accession No. ML052350520), Arkansas Nuclear One (ADAMS Accession No.ML0311801180), and Millstone (ADAMS Accession No. ML093521388) documents. In some cases specific positions in the above documents were omitted from the RIS. *Proposed resolution: include missing positions especially those related to determining minimum expected offsite system voltages and testing.*	Disagree The RIS covered the key topics intended to address inspection findings. The reference documents must be reviewed for more details. The expected offsite system voltages can vary between 0-110 percent. The objective of the LVR and DVR is to afford protection and separation from the grid when plant specific needs cannot be satisfied.
34	General	Southern Nuclear Operating Company	The RIS lacks adequate guidance to perform the requested calculation(s) without additional interpretations by the licensee and auditors as to the intent of the provided guidance. *Proposed resolution*: *Provide a guideline with*	Disagree The RIS is consistent with GL 79-36. The licensee is responsible for performing calculations, in accordance with industry

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			examples on how to perform the calculation(s) including expected assumptions, other considerations, and criteria to be used for acceptance.	engineering practices, with properly supported inputs and assumptions that demonstrate compliance in accordance with 10 CFR 50, Appendix B, criterion III. The RIS addresses certain problem areas identified mainly through NRC inspections and to re-emphasize the existing NRC requirements and staff positions.
35	General	Southern Nuclear Operating Company	The RIS provides some examples of plants that have NRC reviewed and approved analyses and goes on to point out that "backfit rule" was applied because the staff believed the sites were not in compliance with regulations even though they had approved the analysis. How is a licensee who has an NRC approved or acceptable analysis supposed to know that their analysis is no longer acceptable? The RIS needs more clarification with regard to individual plant licensing bases if it is to be useful to licensees. Some plants have installed degraded grid alarm systems and, at the staff request, included them in Unit Operating Technical Specifications. Required operator actions related to degraded grid conditions are specified in the bases and procedures. The RIS does not discuss this approach. There are a number of plants that have URIs related to this issue. Issuance of this RIS could be used by inspectors to close the URIs to violations without regard to plant specific licensing bases, resulting in regulation by inspection.	Disagree The licensee must be in compliance with all regulations pertaining to onsite and offsite power systems. Unless, licensees are exempted from meeting certain regulatory requirements, changes to the design and licensing bases are required to meet the regulations in accordance with 10 CFR 50.109. The RIS identified some of the recent inspection findings. Operator actions could be used only to supplement the automatic DVR scheme by providing alarm in the control room when grid voltage is below nominal operating range. Operator actions cannot be substituted for protecting the safety related equipment from degraded voltage. 10 CFR 50.55 (a) (h) requires all protective actions to be automatic. The intent of the RIS is to highlight the basis for DVR requirements and preclude future findings in plant designs. The RIS does not provide new guidelines for issuing violations.
36 .	Summary of Issues", pg. 6, Item 1. "Degraded Voltage Relaying Design Calculations", Line 5.	Southern Nuclear Operating Company	The RIS states "The Class 1 E buses should separate from the offsite power system within a few seconds if an accident occurs coincident with sustained degraded voltage conditions." GDC 17 describes the requirements for onsite and offsite power systems. One of its requirements is that they each provide sufficient capacity and capability to mitigate postulated events. The events are described in Chapter 15 "Accident Analysis". These analyses assume Loss of Offsite Power simultaneous with the event. They do not require assuming degraded grid voltage condition prior to an event occurring. In addition because of FERC and NERC requirements for voltage control, the likelihood of a chapter 15 accident occurring concurrent with a serious degraded grid voltage condition is not believed to be credible. *Proposed resolution*: Remove or clarify this statement since proper offsite system design and operation renders such simultaneous postulated events as incredible.	Disagree. The RIS correctly states that if an accident signal is received during sustained degraded grid conditions, it may be prudent to separate from the grid as : 1. The duration of degraded conditions on the grid is unknown 2. It precludes other complications such as double sequencing. Chapter 15 “Accident Analyses” assumes “Loss of Offsite Power” as a limiting case for safe shutdown in view of the limited power and resources available from the onsite power sources. The preferred power source for all operating modes and accident related safe shutdown is the offsite source. The DVR provides assurance that the plant shutdown capability is not compromised when the offsite source is degraded and a fast transfer can occur to the onsite sources if the offsite source does not recover within the allotted time. This preserves the Chapter 15 accident analyses. NERC and FERC requirements for voltage control are beneficial to nuclear plant operators as they provide assurance that grid parameters will be maintained within

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				acceptable limits for normal nuclear plant operations. However, the transmission system is always vulnerable to perturbations such as line outages, overload conditions, generation shortages etc. which are beyond the control of the grid operator. The magnitude and duration of these perturbations cannot be predicted. The safety of the nuclear plant must not be compromised during these conditions. The function of the DVR is to protect redundant safety related equipment during these grid perturbations. The staff considers degraded voltage condition and coincident LOCA can occur. Until the DVR relay takes automatic action, the offsite power is considered to have adequate capacity and capability. Therefore, the accident analysis assumption for a LOCA with offsite power available applies.
37	Summary of Issues", pg. 6, Item 1. "Degraded Voltage Relaying Design Calculations", Line 7	Southern Nuclear Operating Company	The RIS states "During normal plant operation, the Class 1 E safety related buses should automatically separate from the power supply within a short interval (typically less than 60 seconds) if sustained degraded voltage conditions are detected." During normal plant operation (i.e. non LOCA), the degraded grid relay settings may be overly conservative. Therefore automatic separation from the preferred power supply may not be desired. *Proposed resolution: Transmission Operators should be allowed time to correct the degraded voltage condition while Plant Operators monitor the safety bus voltages for adequate voltage.*	Disagree. See staff's response to Comment No. 9 Voltages down at the DVR level should be well below the normal grid voltage levels. Transmission operators will be taking actions when voltages fall below the normal low level (or post contingency low) well above the DVR value (assuming the plant design is proper given the grid operating voltage range). The plant electrical distribution system design should be based on the grid voltage range including the bounding worst case grid contingency (strong or weak grid depending on which one is bounding). In this way, the plant's design ensures adequate voltage to plant equipment as long as grid is operating as "expected". GDC 17 requires that offsite power has sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of *anticipated operational occurrences,* and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of *postulated accidents.*
38	Summary of Issues, Last paragraph of "DVR criteria for time delay selections. Setting Design Calculations", pg. 7	Southern Nuclear Operating Company	The discussion on time delays does not provide adequate criteria for time delay selections. Proposed Resolution: Clarify. The RIS states " In this manner, the DVR ensures adequate operational (starting and running) voltage to all safety related equipment, independent of voltage controlling equipment external to the plant safety related electrical distribution system. For the purposes of this calculation, no t credit should be taken for voltage controlling equipment external to the Class 1E distribution system such as automatic	Disagree The acceptable level of time delay is based on plant specific accident analyses and electrical systems designs. Different time delays may be selected for different plant designs. BTP PSB-1 suggests two relays with different settings to accommodate motor starts and sustained degraded conditions. Typically, chapter 15 accident analyses assume 10 second time delay for onsite power sources to energize safety busses. DVR time delay of 10seconds

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			load tap changers and capacitor banks." Proposed Resolution: This statement needs to be clarified to allow reasonable assumptions for the status of equipment external to the Class 1E distribution system. For example it is unclear how to perform motor starting calculations without taking credit for some Non 1E voltage controlling equipment. Additionally, normal Transmission grid switching to prepare for the next contingency to maintain minimum expected transmission system voltages should be allowed.	or less may be acceptable to demonstrate that the assumptions in the accident analyses remain valid. External voltage regulating equipment (tap changers) does not afford timely protection for safety related equipment during sudden grid perturbations and therefore cannot be credited for DVR settings including transient voltages during motor starts. See staff's response to Comment Nos. 76 and 118.
39	Summary of Issues, Guidelines for voltage drop calculations, item (f) pg. 8	Southern Nuclear Operating Company	After paragraph (f) the RIS leaves out the guidance in GL 79-36 concerning minimum expected values (item 6 of enclosure 2) was omitted from the RIS guidance. *Proposed resolution: Add item 6 of enclosure 2 in GL 79-36 to the RIS.*	Disagree Item 6 was addressed in item(a) in the RIS
40	General	NEI 3/2/11 Letter	NEI contends that RIS represents new positions	Disagree The RIS provides clarifications to avoid the misconception of the existing requirements and NRC staff positions. No new requirements are identified in the RIS.
41		NEI 3/2/11 Letter	77 Letter and PSB-1 Not consistent. Degraded voltage event and accident coincident vs. subsequent. Also, starting and running voltage vs. just running (term sustained in PSB-1)	Disagree PSB just states how the scheme should react to a subsequent degraded voltage. The 77 letter states that the time delay must support the accident analysis which means coincident events.
42		NEI 3/2/11 Letter	77 Letter and 79 GL are generic communications not requirements	Disagree The 77 Letter issued to all operating plants and was considered a requirement to meet GDC 17 or applicable plant design criteria. The same requirement was reviewed during the plant licensing phase using the 1977 letter and BTP in the SRP. However, 79-36 is a Generic Letter.
43		NEI 3/2/11 Letter	Multi-unit sites, accident and simultaneous shutdown vs. orderly shutdown and cooldown per GDC 5	Disagree This statement is consistent with GDC 17, GL 79-36, and IEEE Standard 308-1971, "Class IE Electrical Systems," Section 8, "Multi-Unit Station Considerations.
44		NEI 3/2/11 Letter	During normal plant operation, a degraded voltage for 60 seconds resulting in separation doesn't give the operator enough time (implied by PSB-1) to take actions	Disagree See NRC response to .Comment No. 9.
45 (46- 48 not used)		NEI 3/2/11 Letter	Offsite/Onsite design interface calculations doesn't allow for manual actions	Disagree This means that manual actions for the

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Also see Nos. 86-96 for this NEI Letter				purposes of analyses of the offsite power system voltages should not be assumed. See GL 79-36 for more details. PSB-1 allows manual actions after first alarm at higher voltage.
49	Page 6, DVR Setting Design Calculations	Jerry Nicely	Section DVR Setting Design Calculations states: *At the DVR dropout setting ..... the DVR ensures adequate operational (starting and running) voltage to all safety related equipment, independent of voltage controlling equipment external to the plant safety related electrical distribution system.* BTP PSB-1 states, "sustained", implying a steady state voltage condition and not a transient voltage condition that exists during a motor starting event. The original 1977 NRC Letter, the later PSB-1, or GL 79-36 does not require plants to demonstrate the ability to start motors at the DVR settings. Requiring the ability to start motors at the DVR dropout setting does not accomplish anything or make sense, since starting a motor at this voltage will ensure a resultant voltage below the DVR dropout; result in not being able to be reset the relay, and as a result causing a spurious disconnection from offsite power and transferring to the emergency diesel generator. Having a requirement to be able to start motors at the DVR dropout setting will result in the raising the DVR settings to a higher value and is more likely to result in spurious separation from the grid which is in direct conflict with PSB-1.	Disagree See Responses to Questions 1 & 2. 'Sustained' in the context that the loss of voltage relay was designed for momentary dip in voltage or complete loss of voltage. Steady state operation is expected at normal operating band. The 1977 NRC letter states that "voltage and time setpoints shall be determined from an analysis of the voltage requirements of the safety related loads." Safety related equipment, particularly large motors, have starting and running "voltage requirements." This second level of protection must address these "voltage requirements." Sustained degraded voltage, as discussed in the 1977 NRC letter, refers to grid voltage below the expected low value given normal grid operation and grid post contingency (Single, N-1). Thus, when grid voltages are degraded beyond the minimum voltage assured by the grid operator(such as resulting in SR bus voltages down close to where DVRs are set based on SR equipment requirements), separation from the grid is appropriate. Proper design of the plant electrical distribution system and setting of the DVRs, based on the grid voltage range (described above) should provide proper margin such that spurious separation from the grid should not occur. The key point is that the voltage setting(s) selected must ensure that adequate voltage is available at the component terminal(s) to operate the most limiting component (s) at a plant during the most limiting design basis event. The offsite/onsite interface calculation must show that, with the grid at the lower limit of the normal operating range, voltage at the safety bus is always well above the degraded voltage setpoint for all design basis event loading conditions (normal, abnormal and accident conditions including anticipated operational occurrence).
50	Page 5, Peach Bottom	Jerry Nicely	In the RIS section of recent inspection findings for Peach Bottom, it was stated that since the load tap changers are not safety-related and are subject to operational limitations and credible failures, they cannot be relied on.	Agree The finding is correct. The safety related equipment must be protected by Class1E relays and not dependent on non safety LTCs functioning. The DVR action is independent of LTC action. Therefore, no credit must be taken for determining the setpoint of DVR relay. The response time of tap changers is relatively slow. Redundant safety related

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				equipment may be exposed to degraded voltage conditions that can last for minutes depending on tap changer response time.
51	Page 8, c)	Jerry Nicely	In the Offsite/Onsite Design Interface Calc section (C) it states: an accident in the unit being analyzed and *simultaneous shutdown* of all other units at the station. RG 1.81 states: The Regulatory staff has determined that, because of the low probability of a major reactor accident, a suitable design basis for multi-unit nuclear power plants is the assumption that an accident occurs in only one of the units at a time, with all remaining units proceeding to an orderly shutdown and a maintained cooldown condition; 10CFR50 App A Criterion 5 states: **...** in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units; NUREG 0800 Section 8.2 states: **.....** in the event of an accident in one unit, with a simultaneous orderly shutdown and cooldown of the remaining units. Based on the above Regulatory positions, the RIS should consider rewording the "simultaneous shutdown" to "orderly shutdown".	Disagree For electrical system, the statement in the RIS is consistent with GDC 17, GL 79-36, and IEEE Standard 308-1971, "Class IE Electrical Systems," Section 8, "Multi-Unit Station Considerations.
52	Page 6, DVR Setting Design Calculations	Larry Nicholson, Nexterra	This paragraph could be interpreted to require the LOCA sequence to be modeled at the DVR dropout setting. LOCA sequencing modeled at the DVR dropout setting would result in separation of the buses from the Preferred Power Source (off-site power) as the voltage would not recover above the DVR reset value. Proposed Resolution: Clarify the intent to show safety related equipment will function at the selected DVR dropout setting voltage and that it is not expected to start the LOCA sequence from this voltage level. Clarify that LOCA sequencing is evaluated using minimum switchyard voltage as the starting point.	Disagree See response to questions 1&2 The sustained degraded voltage conditions are not expected to last the total sequencing process. The analyses should demonstrate that the largest load (limiting case) for accident mitigation can be successfully started under degraded grid conditions and the loads that are normally operating will not be adversely impacted. It is expected that the grid will either recover to nominal voltage and reset the DVR for the rest of the sequencing process or the DVR will separate the plant from source that cannot support safe shutdown.
53	Page 6, DVR Setting Design Calculations	Larry Nicholson, Nexterra	Having a sustained degraded voltage just above the LVR voltage setling (70%) is not practical without grid collapse and does not exist in Branch Technical Position #1 (PSB-1). Proposed Resolution: Clarify degraded voltages to be analyzed to a credible level.	Agree Although undervoltage protection (first level) is not within the scope of the RIS, the licensees' analysis should ensure that the LVR and DVR settings protect the Class 1E components from voltage ranges between the DVR and LVR settings due to sustained degraded conditions.
54	Page 6, DVR Setting Design Calculations	Larry Nicholson, Nexterra	The statement that the DVR ensures adequate operational (starting and running) is the first time in NRC correspondence that starting equipment at the DVR setpoint is expected. The example letter sent to Peach Bottom in June 1977 did not require starting of equipment at the DVR setpoint. This requirement should be removed from the RIS since it is not possible to start equipment at the DVR setpoint and not subsequently separate from offsite power. If the equipment starts at the DVR setpoint, the voltage will dip during the transient and must then recover above the reset point to avoid separation from offsite power. Since the reset point will always be above the DVR dropout point it will be impossible to reset the relay.	Disagree The NRC 1977 letter states that "voltage and time setpoints shall be determined from an analysis of the voltage requirements of the safety related loads". Safety related (Class 1E) equipment, particularly large motors, have starting and running "voltage requirements". This second level of undervoltage protection must address these "voltage requirements"

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			Proposed Resolution: Remove starting equipment at the DVR setpoint as a requirement.	
55	Page 7, DVR Setting Design Calculations	Larry Nicholson, Nexterra	It is agreed that no credit is to be taken for voltage controlling equipment external to the Class 1 E distribution system for the establishing the degraded voltage relay (DVR) settings; however, it should be clarified that for credit may be taken for minimum switchyard voltage/voltage drop calculations (or the Offsite/Onsite Design Interface Calculations). Proposed Resolution: Clarify that credit must be taken for automatic load tap changers and/or capacitor for minimum switchyard voltage/voltage drop calculations (or the Offsite/Onsite Design Interface Calculations).	Agree Grid Interface calculations can take credit for voltage correction equipment. The DVR setpoint should be set independent of voltage correction equipment that cannot operate in a timely manner to protect 1E equipment. RIS will be clarified regarding crediting voltage controlling equipment external to the 1E system for Offsite/Onsite Design Interface.
56	Page 8, c)	Larry Nicholson, Nexterra	NRC Generic Letter 79-36, Enclosure 2, Item 2 states that "*For multi-unit stations a separate analysis should be performed for each unit assuming (1)* an *accident in the unit being analyzed* and *simultaneous shutdown of all other units* at *the station; or* (2) an anticipated *transient in the unit being analyzed* (e.g., *unit trip) and simultaneous shutdown* of all *other units at that station, whichever presents the* largest *load situation."* Comment: NRC Draft RIS re-states NRC GL 79-36 verbatim, with an attempt to clarify "anticipated *transient"* by adding in parenthesis *"(anticipated operational occurrence)"* immediately afterwards. It is not clear what the added parenthetical statement is meant to convey, other than unit trip (which already exists in GL 79-36). Proposed Resolution: It is recommended that this either be removed, or stated "anticipated transient per station licensing basis".	Disagree Anticipated Operational Transient is a more general term for operational events per the design except for design basis accidents This is consistent with the term used in GDC 17.
57.	Page 8, c)	Larry Nicholson, Nexterra	NRC should clarify "simultaneous shutdown" with consideration to: Most multi-unit station's Licensing Basis consider an "orderly or controlled safe shutdown" of the other unit(s) not being analyzed. NERC Std TPL-004-0; particularly Category D events per Table 1, where a *"loss* of *all generating units at a station"* may result in *"portions* or *all* of *the interconnected systems may or may not achieve a new, stable operating point'.* IEEE Std 308-1974, Clause 8, subclause 8.1.1 "Capacity" describes this as a "concurrent safe shutdown on the remaining units". Proposed Resolution: The wording for the proposed RIS, sub clause 2.c should be revised to indicate "orderly or controlled safe shutdown of the remaining units, as per the station's licensing basis" instead of "simultaneous shutdown". Alternatively, the wording "shutdown consistent with the station licensing basis" could be used instead of "simultaneous shutdown".	Disagree This statement is consistent with GDC 17, GL 79-36, and IEEE Standard 308-1971, "Class IE Electrical Systems," Section 8, "Multi-Unit Station Considerations.
58	Page 8, e) and f)	Larry	These guidelines seem contradictory that you	

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		Nicholson, Nexterra	cannot credit procedurally controlled operator actions to reduce load but you have to assume the actions will be carried out when load is added. Proposed Resolution: Delete "e) Manual load shedding should not be assumed" or add allowance to credit procedurally controlled operator actions to decrease load.	Disagree Adding loads manually per procedure is conservative in terms of max loading. Not the case for load reductions. Plant design should not depend on manual load shedding. This is not conservative. That was the point of item e).
59	General	NEI 3/18/11 Letter / 1	The RIS should identify that plant compliance with the regulation (GDC 17) is by each plant operating within its Licensing Basis.	Agree Second level undervoltage protection (degraded voltage protection) applies to all operating plants whether the plant is GDC or pre-GDC plant.
60	General	NEI 3/18/11 Letter / 2	Definitions vary for the same words used with respect to this topic. The RIS should include definitions for key terms, e.g. normal grid operation, sustained degraded voltage, etc.	Agree Clarifications will be provided in the RIS wherever appropriate.
61	General	NEI 3/18/11 Letter / 3	There are various documents that address the Adequacy of Station Electric Distribution System Voltages. These documents have differences in the methodology, terminology, and level of detail. Such differences challenge the users of these guidance documents when they conflict. Attachment 2 to the NEI supplemental comment letter provides a table that shows the differences between GL 79-36, (BTP) PSB-1, IEEE 741, and the draft RIS. The RIS should identify the guidance document differences, establish the NRC position on each conflicting topic, and provide the basis for each change in previously accepted guidance.	Disagree The RIS provides adequate clarifications to the existing guidance. The staff positions described in the NRC 1977 letter is to be implemented by all licensees to meet GDC 17 or applicable plant's principle design criteria. This letter focuses on requiring a second level undervoltage protection scheme to protect the Class 1E electrical components from the consequences of sustained degraded voltage conditions. GL 79-36 emphasizes the electrical design attributes to be considered for the interface of onsite and offsite distribution systems to ensure adequate voltages to the Class 1E buses and safety related components for normal, abnormal, and accident conditions to comply with GDC 17 or applicable plant's principle design criteria requirements. BTP PSB-1 incorporates both the above staff positions and guidance to meet GDC 17 requirements. IEEE 741 is only referenced in the SRP. The NRC has not endorsed this industry guidance.
62	Page 1, 3rd paragraph	NEI 3/18/11 Letter / 4	*"The U.S. Nuclear Regulatory Commission (NRC) is issuing this Regulatory Issue Summary (RIS) to clarify the NRC staff's technical position on existing regulatory requirements and voltage studies necessary for Degraded Voltage Relay (second level undervoltage protection) setting bases and Transmission Network/Offsite/Onsite station electric power system design bases."* No regulatory requirements are referenced except for a generic reference to GDC 17. Reword the paragraph to read: 'The U.S. Nuclear Regulatory Commission (NRC) is issuing this Regulatory Issue Summary (RIS) to clarify the NRC staff's technical position on	Agree The RIS will be revised to incorporate this comment.

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			Degraded Voltage Relay (second level undervoltage protection) setting bases and Transmission Network/Offsite/Onsite station electric power system design bases appropriate for meeting the regulatory requirements specified in GDC 17.'	
63	Page 2, Paragraph a)	NEI 3/18/11 Letter / 5	*"The selection of voltage and time delay setpoints shall be determined from an analysis of the operating voltage requirements of safety related loads at all onsite system distribution levels"* Requirements for DVR settings have never used the term "operating voltage". They instead used "sustained voltage" which by definition would be steady state voltage, running voltage, or voltage held at a constant value (BTP) PSB-1 and BTP 8-6 are silent on operating/running voltage in the DVR settings section; however, running is implied by using the term "sustained" in the Time Delay settings section. To be consistent with (BTP) PSB-1, NRC letter, and BTP 8.6 remove the word "operating".	Disagree Voltage requirements – all voltage requirements of SR equipment The term “operating” voltage is being removed from the RIS as recommended. The term sustained voltage used in the 1977 letter and the BTPs is referring to the voltage condition on the grid, not steady state voltage
64	Page 3, Arkansas Nuclear One	NEI 3/18/11 Letter / 6	*"...assuming all onsite sources of AC power are not available, the offsite power system and the onsite distribution system is of sufficient capacity and capability to automatically start as well as operate all required safety related loads."* This sentence implies that the NRC use of the term "operate" does not mean the same thing as 'start', i.e., operate/start/running are not synonymous. NEI supports this interpretation; however, it conflicts with the words "proper voltage for starting and running in all operational configurations" in the 1st paragraph of page 6.	Agree The term operating voltage is being removed from RIS.
65	Page 6, 1st Paragraph	NEI 3/18/11 Letter / 7	*"...components are provided adequate voltage based on the design of the Class 1E distribution system in the plant and its most limiting operating configuration."* There is a need to better define "most limiting operating configuration", since experience shows that a component is most limiting. Reword the RIS to: '...components are provided adequate voltage based on the design of the Class 1E distribution system in the plant.'	Agree. RIS will be revised to state the following: *"... all safety related components are provided adequate voltage based on the design of the plant power distribution system (and the offsite circuits), including the design of the Class 1E distribution system in the plant and its most limiting operating configuration(s)."* Operating configurations affect limits as well as components.
66	Page 6, 1st paragraph	NEI 3/18/11 Letter / 8	*"The Offsite/Onsite Design Interface Calculations specify the voltage operating parameters of the plant electrical distribution system based on the transmission system (Offsite) operating parameters."* This paragraph could be interpreted to require the LOCA sequence to be modeled at the DVR dropout setting. LOCA sequencing modeled at the DVR	Disagree

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			dropout setting would result in separation of the buses from the referred Power Source (off-site power) as the voltage would not recover above the DVR reset value. The RIS should state that the intent is to show safety related equipment will function at the selected DVR dropout setting voltage and that it is not expected to start the LOCA sequence from this voltage level. The RIS should state that LOCA sequencing is typically evaluated using minimum switchyard voltage as starting point.	This sentence is not referring to calculations for setting the relays but referring to *Offsite/Onsite Design Interface Calculations.*
67	Page 6, 1st paragraph	NEI 3/18/11 Letter / 9	*"This interface calculation establishes operating voltage bands for all plant electrical buses, which ensures that all plant components and systems (Class IE and Non Safety Related) have proper voltage for starting and running in all operational configurations (expected operational and accident conditions)."* This statement needs clarification in that not all non-safety load voltages need to be evaluated. The statement that the DVR ensures adequate operational (starting and running) is the first time in NRC correspondence that starting equipment at the DVR setpoint is expected. Having a sustained degraded voltage just above the LVR voltage setting (70%) is not practical without grid collapse and does not exist in Branch Technical Position #1 ((BTP) PSB-1). Typically, large motors (like reactor coolant pumps) need to be evaluated for starting impact on the safety bus. Once a motor is found to be small enough to not impact safety bus operation, further evaluation is unnecessary. The statement in the RIS can easily be interpreted as requiring evaluation of all non-safety loads down to the lowest levels of distribution. Technical compliance with determining the degraded voltage relay setpoint would not be achievable because the RIS requires the DVR dropout setpoint to be based on the starting voltage required for motors. Basing the DVR setpoint (dropout setting) on starting voltage requirements (rather than steady-state operating voltage) appears to be a new NRC requirement/position. It is technically flawed in that it would not actually provide the required protection for the Class-IE loads. It also appears to disagree with the intended purpose of the existing regulations (1977 NRC Letters on degraded voltage protection and (BTP) PSB-1). The letter sent to Peach Bottom in June 1977 did not require starting of equipment at the DVR setpoint. This new requirement should be removed from the RIS, since it is not possible to start equipment at the DVR setpoint and not subsequently separate from offsite power. If the equipment starts at the DVR setpoint, the voltage will dip during the transient and must then recover above the reset point to avoid separation from offsite power. Since the reset point will always be above the DVR dropout point, it will be impossible to reset the relay.	Disagree See response to questions 1&2 for clarification. The 1977 NRC letter refers to SR equipment voltage requirements. NSR items are being removed from RIS. However, non safety related loads need to be modeled to the extent that their operation can affect safety bus/equipment voltage. DVR setpoints are based on low voltages that can occur due to sustained grid perturbations and can potentially degrade capability of onsite safety related equipment. The NRC 1977 letter states that “voltage and time setpoints shall be determined from an analysis of the voltage requirements of the safety related loads”. Safety related equipment, particularly large motors, have starting and running “voltage requirements”. This second level of protection must address these “voltage requirements”. Sustained degraded voltage, as discussed in the 1977 letter, refers to grid voltage below the expected low value given normal grid operation and grid post contingency (Single, N-1). Thus, when grid voltages are degraded (such as resulting in SR bus voltages down close to where DVRs are set based on SR equipment requirements), separation from the grid is appropriate. The design of the plant electrical distribution system and setting of the DVRs, based on the grid voltage range (described above) should provide proper margin such that spurious separation from the grid should not occur due to sequencing or block loading of loads during a design basis events.

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				Motor starts have been discussed in several questions above. An accident signal concurrent with degraded grid conditions will require motor starts. All NRC communications discuss the requirement for safe shutdown of the plant following postulated events.
68	Page 6, 2nd paragraph	NEI 3/18/11 Letter / 10	*"The staff considers degraded voltage conditions coincident with a postulated design basis accident to be a credible event. DVRs should be set to protect the safety related equipment from sustained degraded voltage conditions."* GDC 17 should be identified as the regulatory requirement. This RIS is creating conditions in excess of GDC 17. The RIS concludes that the staff considers degraded voltage conditions coincident with a postulated design basis accident to be a credible event; however, this is not consistent with GDC 17. The RIS should identify that plant compliance with the regulation (GDC 17) is by each plant operating within its Licensing Basis that was developed from available NRC and industry guidance. Most licensees are committed to a version of IEEE 308, Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations. This Standard defines the malfunctions, accidents, environmental events, and operating modes (i.e., design basis events) that could physically damage Class 1E power systems or lead to degradation of system performance and for which provisions shall be incorporated. A degraded voltage condition coincident with a postulated design basis accident is not among the identified design basis events; however, the Standard does include a requirement for the protection from common mode failure.	Disagree The 1977 NRC letter staff positions (implementation second level undervoltage protection scheme) apply to all operating plants and are considered requirement s to meet GDC 17 or equivalent principal design criteria. The 1977 NRC letter states that the DVR scheme time delays must support accident analysis assumptions which ties degraded event with an accident.
69	Page 6, 2nd paragragh	NEI 3/18/11 Letter / 11	*"The Class 1E buses should separate from the offsite power system within a few seconds if an accident occurs coincident with a sustained degraded voltage conditions."* GDC 17 describes the requirements for onsite and offsite power systems. One of its requirements is that they each provide sufficient capacity and capability to mitigate postulated events. The events are described in Chapter 15 "Accident Analysis". These analyses assume Loss of offsite Power simultaneous with the event. They do not require assuming degraded grid voltage condition prior to an event occurring. In addition, because of FERC and NERC requirements for voltage control, the likelihood of a chapter 15 accident occurring concurrent with a serious degraded grid voltage condition is so low that it is believed to be not credible. Remove or clarify this statement, since proper offsite system design and operation renders such	Disagree The NRC 1977 letter states that the DVR scheme time delays must support accident analysis assumptions which ties degraded event with an accident. See NRC response to Comment No. 36

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			simultaneous postulated events as incredible. This position assumes (BTP) PSB-1 (BTP 8-6) is part of the license and design basis for all licensees. An equivalent position was not identified in the NRC letters issued following the Millstone event. Specifically, this requirement is more stringent than the position stated on Page 2, Item d) and may constitute a backfit to some licensees. Care must be exercised with regards to the scope of this position. It does not apply to Section 2, "Offsite/Onsite Design Interface Calculations" of the RIS. This is confirmed in the draft RIS on Page 8, Paragraph d) which states all electric system action occur "as designed". It would be beneficial to clarify the scope limitations associated with this or any revised position.	Section 2 is not about DVR schemes and separation during a degraded voltage condition. It is about operation of the plant during normal, abnormal and accident conditions and assuming the normal operation of the grid (including the bounding N-1 contingency and the trip of the unit for the accident cases).
70	Page 6, 2nd paragraph	NEI 3/18/11 Letter / 12	*"... Position (BTP) PSB-1 (revised later to become BTP-6), is to protect Class 1E safety related buses and components from sustained degraded voltage conditions on the offsite power system coincident with an accident as well as during non-accident conditions."* A definition of the word "protect" is needed. It is not clear what is being protected: the components (MOV, motor, etc.) or the class 1E function or something else. The word "coincident" should read "subsequent to" or "followed by", per (BTP) PSB-1 and BTP 8-6.	Disagree Protect means guard or defend safety related components against the consequence of sustained degraded voltage conditions. Coincident is appropriate based on the 1977 NRC letter verbiage. The BTPs just provide a design which would also deal with an event when a SIAS signal would occur subsequent to the degraded voltage condition as well (not conflicting)
71	Page 6, 2nd paragraph	NEI 3/18/11 Letter / 13	"The Class 1E buses should separate from the offsite power system within a few seconds if an accident occurs coincident with a sustained degraded voltage condition." Per (BTP) PSB-1, the text should read: 'The Class 1E buses should separate from the offsite power system immediately if an accident occurs subsequent to a sustained degraded voltage condition.'	Agree. RIS will be revised to incorporate the comment.
72	Page 6, 2nd paragraph	NEI 3/18/11 Letter / 14	*"... Class 1E safety related buses should automatically separate from the power supply within a short interval (typically less than 60 seconds)..."* There is no basis for "typically less than 60 seconds". In the original context of the time delay section, it was sufficient time for an operator to intervene" which is much greater than 60 seconds. Remove the parenthesis section of the sentence. With this guidance during normal plant operation, the degraded grid relay settings may be overly conservative; automatic separation from the preferred power supply may occur under conditions	Agree RIS will be revised to delete the parenthesis section of the sentence as suggested. Disagree 10 CFR 50.55(a) (h) requires all protective actions to be automatic. Operator

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			where this action is inappropriate. The RIS should allow Transmission Operators time to correct the degraded voltage condition while Plant Operators monitor the safety bus voltages for adequate voltage.	intervention is probably not possible when voltage gets down to the DVR setpoint (grid voltage is well below normal). Operator action takes minutes. Operation at degraded voltage conditions can degrade equipment performance capabilities within seconds.
73	Page 6, 3rd paragraph	NEI 3/18/11 Letter / 15	DVR Setting Design Calculations This section would be a good place to describe this type of analysis as having a "bottom-up" approach. Such calculations would prevent confusion of crediting anything above the DVR voltage sensors' values. In the context of DVR Setting Design Calculations, using a steady state or sustained voltage analysis is the only way that can result in a voltage 'setting' requirement.	Disagree The approach is already described in this paragraph. The term sustained voltage used in the NRC 1977 letter and the BTPs is referring to the voltage condition on the grid, not steady state voltage
74	Page 6, 3rd paragraph	NEI 3/18/11 Letter / 16	*"... DVR ensures adequate operational (starting and running) voltage..."* The "operational voltage" cannot define both starting and running voltages. The only place "operational voltage" is referenced in the associated documents is in the tap setting section of (BTP) PSB-1 and BTP 8-6 when a plant is connected to the offsite power supply. The only qualifying term used in the protection of the equipment is 'sustained' which is synonymous with steady state or running. Reword the RIS to: '... DVR ensures adequate sustained voltage...'	Agree RIS will be revised to state "… DVR ensures adequate voltage (start and run conditions)…" Disagree The term sustained voltage used in the NRC 1977 letter and the BTPs is referring to the voltage condition on the grid, not steady state voltage
75	Page 6, 3rd paragraph	NEI 3/18/11 Letter / 17	*"Licensee voltage calculations should provide the basis for their DVR settings, ensuring safety related equipment is supplied with adequate operating voltage (typically a minimum of 0.9 per unit voltage at the terminals of the safety related equipment per equipment manufacturers requirements), based on bounding conditions for the most limiting safety related load (in terms of voltage) in the plant."* Equipment manufacturers do not provide the same voltage requirement to perform both running and starting a motor. The 0.9 per unit in this context refers to the typical running voltage requirement of a motor; whereas, 0.85 per unit is typical for a starting voltage requirement. The RIS should identify that voltages other than 90% voltage are common based on detailed plant analysis. For example, motors below 90% voltage continue to have plenty of margin in torque but may encroach on long time thermal limits. Unless a	Agreed This sentence is being reworded Starting requirements for motors have been observed over a range of 0.75 to 0.85. It depends on the particular plant and how the motors were procured. Either way, the voltage requirements must be preserved (starting and running). However, there could be other components that are more sensitive

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			motor is fully into its service factor (typicallyl.15) and below 90% voltage, operation will be acceptable.	to voltage for operation. 0.9 per unit voltage was mentioned as an example and was not meant to cover everything. RIS will be revised to delete references to specific numbers and emphasize voltage requirements and voltage requirements are plant-specific. The design basis of the plant should determine the adequacy of voltage. The RIS clarifies the regulation.
76	Page 6, 3rd paragragh	NEI 3/18/11 Letter / 18	*"In this manner, the DVR ensures adequate operational (starting and running) voltage to all safety related equipment, independent of voltage controlling equipment external to the plant safety related electrical distribution system."* The draft RIS suggests the DVR dropout setpoint to be based on the starting voltage required for motors. Basing the DVR dropout setpoint on starting voltage requirements rather than steady-state operating voltage appears to be a new NRC requirement/position. It also appears to disagree with the intended purpose of the existing requirements and guidance (1977 NRC Letters on degraded voltage protection and (BTP) PSB-1). As suggested, the approach incorrectly implies that the load(s) should start from the lowest DVR dropout setting. A specific example for illustration is as follows: If the initial voltage value is at the lowest possible value above dropout actuation, starting a load will cause the DVR dropout. Since the new steady state voltage will be lower than the initial value because of the added loads, the DVR reset will never occur. Many utilities use the ABB 27N with harmonic filter which has a minimum 0.5% reset. Thus, with a setting of 93.6% +/- 0.9**%,** the dropout value could be as low as 92.7%. For motors causing more than 0.5% voltage dip at initial start, even if the voltage at the beginning of the event was 93.2% and a load was started, the DVR will dropout and never reset. This will lead to a grid separation. Reword the RIS to remove "(starting and running)"	Disagree The NRC 1977 letter states that "voltage and time setpoints shall be determined from an analysis of the voltage requirements of the safety related loads". Safety related (Class 1E) equipment, particularly large motors, have starting and running "voltage requirements". This second level of undervoltage protection must address these "voltage requirements". Sustained degraded voltage, as discussed in the NRC 1977 letter as well, refers to grid voltage below the expected low value given normal grid operation. Thus, when grid voltages are degraded (such as resulting in Class 1E bus voltages down close to where DVRs are set based on Class 1E equipment requirements), and the grid does not automatically recover, separation from the grid is appropriate. Proper design of the plant electrical distribution system and setting of the DVRs, based on the grid voltage range (described above) should provide proper margin such that spurious separation from the grid should not occur due to sequencing or block loading of loads during a design basis event. Also, see response to questions 1 & 2.
77	Page 6, 3rd paragraph	NEI 3/18/11 Letter / 19	*"For the purposes of this calculation, no credit should be taken for voltage controlling equipment external to the Class 1E distribution system such as automatic load tap changers and capacitor banks."* The intent of the position appears to ensure that the DVR setpoint(s) protect against the potential loss of ESF equipment, regardless of the component mode of operation. It does not imply that the Class 1E bus must remain connected to offsite power after starting a large motor with an initial bus voltage corresponding to the DVR setpoint and no voltage regulation capability. Actually, the calculation should be performed with the DVR monitored bus voltage at the TS limit, not the DVR setpoint. All that is required is that under motor starting conditions, separation from offsite	Disagree This sentence is being re-worded The point being made is that calculations for the DVR voltage settings should have cases at voltages just above the DVR voltage settings (well below what would be based on normal grid operations and voltage controlling equipment if applicable) to demonstrate that the settings enforce the SR equipment voltage requirements.

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			power occurs before starting loads trip on overload. The intent could be conveyed in more detail. The RIS should allow reasonable assumptions for the status of equipment external to the Class 1E distribution system. For example it is unclear how to perform motor starting calculations without taking credit for some Non 1E voltage controlling equipment. Additionally, normal transmission grid switching should be allowed to prepare for the next grid event, so that minimum expected transmission system voltages are maintained.	This is covered in Offsite/Onsite Design Section calculations (not DVR calculations section) The offsite source is the preferred source of power for plant shutdown. The DVR should not separate the plant from the grid for motor starts. In the event that grid conditions degrade beyond an acceptable point and an accident signal is actuated, BTP PSB-1 recommends separation from the grid. Credit for voltage controlling equipment in the Offsite/Onsite Design Section calculations is appropriate if corrective action can be taken in a timely manner to preclude safety related equipment malfunctions.
78	Page 7, 1st paragraph	NEI 3/18/11 Letter / 20	*"Voltage-time settings for DVR's should be selected so as to avoid spurious separation of the safety buses from the offsite power system during unit startup, normal operation and shutdown."* This position is new and contrary to the NRC historical position stated on Page 2, Item (c)(3). Either the DVR protection scheme favors ESF-equipment-protection or connectivity-to-offsite-power. Otherwise, this position would result in a mutually exclusive requirement. The prevention of spurious separation is addressed by coincident logic channels (Page 2, Item (b)), not the setpoint. If no credit is to be taken for voltage controlling equipment external to the Class 1E distribution system for the establishing the degraded voltage relay (DVR) settings, then the RIS should state that credit may be taken for minimum switchyard voltage/voltage drop calculations (Offsite/Onsite Design Interface Calculations).	Disagree This sentence is being re-worded DVR setting always enforce SR equipment voltage requirements. Offsite/Onsite Design should ensure that there is proper margin between where voltage is in the plant during normal grid operation as compared to voltages in the plant when the DVRs actuate. Credit for voltage controlling equipment in the Offsite/Onsite Design Section calculations is appropriate. However, it is not appropriate to use it for DVR calculations since DVR setpoint is derived from the minimum voltage required at the component terminal at all voltage levels. (Also see response to question #77)
79	Page 7, 1st paragraph	NEI 3/18/11 Letter / 21	*"These DVRs should disconnect the Class 1E buses from any power source other than the emergency diesel generators (onsite sources) if the degraded voltage condition exists for a time interval that could prevent the Class 1E safety related loads from achieving their safety function."* This position ensures ESF functionality, should an undervoltage condition persist. (BTP) PSB-1 was written before the application of voltage regulating devices within the nuclear power plant offsite power circuit boundary. The RIS should clarify that if the calculations necessary to support RIS positions in Section 1, "Degraded Voltage Relaying Design Calculations" and Section 2, "Offsite/Onsite Design Interface Calculations" demonstrate completion of ESF functions within accident analysis assumptions, then immediate separation per (BTP) PSB-1, Section B(1)(b)(i), is no longer the preferred NRC position. (BTP) PSB-1 (BTP 8-6) states: "The subsequent occurrence of a safety injection actuation signal (SIAS) [after an undervoltage condition longer than a motor starting transient]	Disagree The BTP PSB-1 offers an option to set a higher voltage alarm level to support corrective action to restore voltage to normal operating band. Since offsite power is the preferred source of power to mitigate design basis event, it is important that the Offsite/Onsite Design Interface calculations ensure the capacity and capability of the offsite power is adequate to sequence or block load during design basis events without actuating DVRs with sufficient margin available at the safety buses. Separation of the safety buses from the grid is only appropriate when the DVR relays actuate indicating that SR equipment

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			should immediately separate the Class 1E distribution system from the offsite power system." The RIS should state that this (BTP) PSB-1 position is not included in the draft RIS because it provides no added protection in terms of establishing the DVR setpoint(s) or in establishing operability of the offsite power interface. To the contrary, this (BTP) PSB-1 increases the probability of separation from offsite power.	voltage requirements are not being met (not able to protect or provide adequate voltage to the terminals of the SR limiting components at the plant). Analyses to determine such setpoints always required modeling the plant power distribution system such that proper voltages throughout the plant system can be calculated in all operating and accident conditions.
80	Page 7, paragraph 2 a)	NEI 3/18/11 Letter / 22	*"Guidelines for voltage drop calculations* *a) The plant voltage analysis, while supplied from the transmission network, should be based on the operating voltage range of the transmission network connection."* It is recommended that the first sentence of Paragraph 2(a) be deleted. It is covered by Paragraph 2(b), as the switchyard is the "power source" for the offsite power circuits. Paragraph 2(a) addresses both plant and transmission operator analyses. The purpose is to identify that the switchyard voltage results from the transmission operator analysis should be used as an input to the power plant analysis. From the nuclear power plant point of view, the determination as to whether each offsite power circuit is individually capable of performing its design function is based on a postulated post-trip switchyard voltage for the present grid configuration and operating level (i.e. RIS Paragraph 2(b)). As written, it is conceivable that a reader of this paragraph could conclude that the transmission "contingency analysis" is a factor in the nuclear plant analysis regarding "when" the contingency is postulated to occur relative to the postulated plant event. The alteration of the present basis to include concurrent grid/plant events is a change in position and would be subject to backfit consideration.	Disagree Enclosure 2 of GL 79-36 provides guidelines for voltage drop calculations. Accident cases consider the unit trip grid contingency since a trip is assumed to occur coincident with an accident. However, if the unit trip is not the most limiting grid contingency (not the largest grid voltage drop), the cases which assess normal and abnormal operation (non-accident) need to assume the bounding grid contingency (normal grid operating range)
81	Page 8, paragraph 2 c)	NEI 3/18/11 Letter / 23	*"For multi-unit stations, a separate analysis should be performed for each unit assuming (1) an accident in the unit being analyzed and simultaneous shutdown of all other units at the station; or (2) an anticipated transient (anticipated operational occurrence) in the unit being analyzed (e.g., unit trip) and simultaneous shutdown of all other units at that station, whichever presents the largest load situation.* The RIS wording should be revised to indicate "orderly or controlled safe shutdown of the remaining units, as per the station's licensing basis" instead of "simultaneous shutdown". Alternatively, the wording 'shutdown consistent with the station licensing basis" could be used instead of "simultaneous shutdown'. Most multi-unit station's Licensing Basis consider an "orderly or controlled safe shutdown" of the other unit(s) not being analyzed.	Disagree Wording is the same as provided in GL 79-36 This statement is consistent with GDC 17, GL 79-36, and IEEE Standard 308-1971, "Class IE Electrical Systems," Section 8, "Multi-Unit Station Considerations.

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			NERC Std TPL-004-0; particularly Category D events per Table 1, where a "loss of all generating units at a station" may result in "portions or all of the interconnected systems may or may not achieve a new, stable operating point". IEEE Std 308-1974, Clause 8, sub-clause 8.1.1 "Capacity" describes this as a "concurrent safe shutdown on the remaining units". This RIS re-states part of GL 79-36, with an attempt to clarify "anticipated transient" by adding in parenthesis "(anticipated operational occurrence)". It is not clear what the added parenthetical statement is meant to convey, other than unit trip (which already exists in GL 79-36). The RIS should remove this parenthetical addition or state '...an anticipated transient per station licensing basis...'	
82	Page 8, paragraph 2 d)	NEI 3/18/11 Letter / 24	*"All actions the electric power system is designed to automatically initiate should be assumed to occur as designed..."* This statement is consistent with GDC 17 in that the presumption is the onsite AC sources are lost. The postulation of concurrent malfunctions in both the onsite and offsite sources is not required. The RIS should retain this sentence, since it may not have been consistently applied during recent CDBI's.	Agree. No change to this sentence.
83	Page 8, paragraph 2 e) & f)	NEI 3/18/11 Letter / 25	*"e) Manual load shedding should not be assumed.* *f) For each event analyzed, the maximum load necessitated by the event and the mode of operation of the unit at the time of the event should be assumed in addition to all loads caused by expected automatic actions and manual actions permitted by administrative procedures."* These guidelines seem contradictory in that e) states that there may be no credit for procedurally controlled operator actions to reduce load but f) states that the manual action loads must be considered in the maximum load. The RIS should delete "e) Manual load shedding should not be assumed" or add allowance to credit procedurally controlled operator actions to decrease load.	Disagree This guidance is consistent GL 79-36. Adding loads manually per procedure is conservative in terms of maximum loading. Not in the case for load reductions. Plant design for maximum load should not depend on manual load shedding (not conservative). That was the point of item e).
84	Page 8, paragraph 2 f)	NEI 3/18/11 Letter / 26	Omission After paragraph 2 f), the RIS leaves out the guidance in GL 79-36 concerning minimum expected values (item 6 of enclosure 2). Add item 6 of enclosure 2 in GL 79-36 to the RIS: "6. The voltage at the terminals of each safety load should be calculated based on the above listed consideration and assumptions and based on the assumption that the grid voltage is at the "minimum expected value". The "minimum expected value" should be selected based on the least of the following:	Disagree It was not omitted. This is covered in item a)

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			a. The minimum steady-state voltage experience at the connection to the offsite circuit. b. The minimum voltage expected at the connection to the offsite circuit due to contingency plans which may result in reduced voltage from this grid. c. The minimum predicted voltage from grid stability analysis. (e.g., load flow studies)."	
85	Page 8, paragraph 2 j)	NEI 3/18/11 Letter / 27	*"To provide assurance that actions taken to assure adequate voltage levels for safety related loads do not result in excessive voltages, assuming the maximum expected value of voltage at the connection to the offsite circuit, a determination should be made of the maximum voltage expected at the terminals of all safety related actual equipment and their starting circuits (if applicable). If this voltage exceeds the maximum voltage rating of any safety related equipment, immediate remedial action should be taken."* The RIS should remove the word "immediate" describing remedial action. Immediate remedial action could imply control room intervention. The control room has alarm procedures to address high voltage should it occur. Timeliness of remedial actions depends on how high actual voltage reaches and is addressed by procedures. Analyses of high grid voltage with light plant load are standard and provide insights as to what the grid voltage upper limit should be or what compensating activities might be required for light load operations (refueling). The RIS should provide examples of typical responses to high grid voltages. For example: in those cases where unit trip can result in a step increase in grid voltage (most common on higher voltage connections like 765kv), anticipated excursions above desired voltages should be addressed by compensating measures (changing excitation for nearby units, switching in reactor banks, etc.).	Disagree The Offsite/Onsite design should address all grid operating conditions to prevent overvoltages from occurring. The point here is that if a design problem is identified such as overvoltage conditions, immediate actions need to be taken (compensatory and/or permanent design changes) to address the design problem rather than taking actions after it occurs. It is not the intent of the RIS to highlight reasons for voltage perturbations.
86	General	NEI 3/2/11 Letter	Page 2, Paragraph 1 While NEI supports efforts to obtain greater clarity with respect to the staff's technical position in this important area, the draft RIS greatly oversimplifies the regulatory and licensing aspects of the degraded grid voltage protection issue. As a result of this oversimplification, the draft RIS inappropriately combines several generic communications and guidance documents that affected the licensing bases of individual plants in different ways, and fails to adequately address the significant backfitting concerns that arise when attempting to eliminate licensing basis variability via a RIS (or any other guidance document).	Disagree NRC Staff's position is that the RIS is intended to clarify the requirements and associated existing staff positions which would apply to all plants. Any inspection findings that questions the plant-specific licensing bases will be reviewed by the NRR staff in accordance NRC's TIA process.
87	General	NEI 3/2/11 Letter	Page 2, Paragraph 2 Unless it is revised, the draft RIS will unnecessarily increase the potential for loss of the preferred off-site power source and, consequently, increase reliance on emergency diesel generators. NEI believes that the use of emergency diesel generators more frequently than necessary is	Disagree Proper design of the plant electrical distribution system, given the operating range of the grid and the proper selection of DVR settings (based on the voltage

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			inconsistent with GDC 17 and results in an unnecessary loss of defense-in-depth.	requirments of the 1E equipment), should provide more than adequate operating margin, preventing unnecessary separation from offsite power.
88	General	NEI 3/2/11 Letter	Page 2, Paragraph 3, Comment I **The Draft RIS Fails to Adequately Consider Licensing Basis Variability in the Area of Degraded Grid Voltage Protection** The only generic obligation or legally binding requirement mentioned in the Discussion section of the draft RIS is GDC 17.	Disagree. The 77 Letter was a Multi-plant Action B-23 applied to all operating reactors at that time and plants licensed since and it supplemented the requirements in 10 CFR Part 50, General Design Criteria 17.
89	General	NEI 3/2/11 Letter	Page 3, Paragraph 2, Comment I (Cont.) **The Draft RIS Fails to Adequately Consider Licensing Basis Variability in the Area of Degraded Grid Voltage Protection** Although these letters resulted in changes to the licensing bases of the nuclear power plants that received them, they do not function the same way as generally applicable regulatory requirements. That is, these generic communications were only received by plants that were licensed at the time the communications were issued. Operating licenses for the current fleet were issued during a period that ranged from the late 1960s through the 1990s. Thus, not all operating plants received and responded to the generic communications issued in 1977 and 1979.	Disagree. The 77 Letter was a Multi-plant Action B-23 applied to all operating reactors at that time and plants licensed since and it supplemented the requirements in 10 CFR Part 50, General Design Criteria 17 (GDC 17).
90	General	NEI 3/2/11 Letter	Page 3, Paragraph 2, Comment I (Cont.) **The Draft RIS Fails to Adequately Consider Licensing Basis Variability in the Area of Degraded Grid Voltage Protection** Further, the Branch Technical Position (BTP) described in the draft RIS BTP PSB-1, Rev. 0, "Adequacy of Station Electric Distribution System Voltages"--was issued in 1981. BTP PSB-1 and the Standard Review Plan in which it is included were "prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants.... Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required." Thus, BTP PSB-1 would have been directly relevant to plants licensed after its issuance, but not before. Further, the specific details in the information provided in the 1977 letters, Generic Letter 79-36, and BTP PSB-I are not identical.	Disagree. The 77 Letter was a Multi-plant Action B-23 which applied to all operating reactors at that time and plants licensed since and it supplemented the requirements in 10 CFR Part 50, General Design Criteria 17 (GDC 17).
91	General	NEI 3/2/11 Letter	Page 3, Paragraph 3, Comment I (Cont.) **The Draft RIS Fails to Adequately Consider Licensing Basis Variability in the Area of Degraded Grid Voltage Protection** For example, the draft RIS makes several recommendations that may be inconsistent with the approved licensing bases for operating plants, including: The draft RIS proposes "Degraded voltage conditions coincident with a postulated design basis accident." BTP PSB-1 says "subsequent occurrence."	Disagree. NRC Staff asserts that coincident degraded grid and accident is specified in the 77 Letter and the BTP approach supports that position. See also staff response to Comment No. 36.
92	General	NEI 3/2/11 Letter	Page 4, First Bullet, Comment I (Cont.) **The Draft RIS Fails to Adequately Consider Licensing Basis Variability in the Area of Degraded Grid Voltage Protection** The draft RIS proposes "DVR Dropout setting based on starting and running voltage." BTP PSB-1	Disagree. The staff position is consistent with 1977 letter and BTP PSB-1.

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			says "sustained," implying a steady state voltage condition and not a transient voltage condition that exists during a motor starting event.	
93	General	NEI 3/2/11 Letter	Page 4, Second Bullet, Comment I (Cont.) **The Draft RIS Fails to Adequately Consider Licensing Basis Variability in the Area of Degraded Grid Voltage Protection** The draft RIS proposes "separate analysis should be performed for each unit assuming (1) an accident in the unit being analyzed and simultaneous shutdown of all other units at the station." GDC 5 says: "... in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units."	Disagree This statement is consistent with GDC 17, GL 79-36, and IEEE Standard 308-1971, "Class IE Electrical Systems," Section 8, "Multi-Unit Station Considerations.
94	General	NEI 3/2/11 Letter	Page 4, Third Bullet, Comment I (Cont.) **The Draft RIS Fails to Adequately Consider Licensing Basis Variability in the Area of Degraded Grid Voltage Protection** The draft RIS proposes "During normal plant operation, the Class **1E** safety related buses should automatically separate from the power supply within a short interval (typically less than 60 seconds) if sustained degraded voltage conditions are detected." BTP PSB-1 clause B.1.b.2 included provisions for operator manual actions to restore bus voltage on the Class 1 E distribution system. BTP PSB-1 B.1.b.2 says: "The second time delay should be of a limited duration such that the permanently connected Class **1E** loads will not be damaged. Following this delay, if the operator has failed to restore adequate voltages, the Class **1E** distribution system should be automatically separated from the offsite power system. Bases and justification must be provided in support of the actual delay chosen." The draft RIS specifically excludes manual load shedding under the Offsite/Onsite Design Interface Calculations whereas the BTP PSB-1 allows for manual actions to avoid separation from offsite power. The sixty second time delay would not allow operator actions. This appears to be a new NRC position.	Disagree See staff's response to Comment No. 37. Manual actions for the purposes of reducing load for the design of the plant electrical distribution system should not be assumed. This is not precluding load shedding as part of normal operation when there is sufficient time to do so to support adequate voltage. Se GL 79-36 for more details.
95	General	NEI 3/2/11 Letter	Page 5, Paragraph 2, Comment I (Cont.) **The Draft RIS Fails to Adequately Consider Licensing Basis Variability in the Area of Degraded Grid Voltage Protection** In addition to the specific examples provided above, the draft RIS states "[t]he staff considers degraded voltage conditions coincident with a postulated design basis accident to be a credible event." It is unclear what exactly the staff intended with this statement.	Disagree . NRC staff considers that the 77 Letter's Time delay condition (1) establishes the requirement that the DVR circuits must be designed assuming coincident sustained degraded grid voltage and accident events. Upon the onset of the coincident accident and degraded grid event, the time delay for the DVR circuit must allow for separation of the 1E buses from the offsite circuit(s) and connection to the 1E onsite supplies in time to support safety system functions to mitigate the accident in accordance with the FSAR accident analyses.
96	General	NEI 3/2/11	Page 6-7, Comment II	

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		Letter	**The Backfit Discussion Provided in the Draft RIS is Inadequate** Given the complex regulatory and licensing history associated with providing degraded grid voltage protection, the backfitting discussion included in the draft RIS is inadequate. Despite the fact that facility-specific backfits were required as a result of several recent inspection findings on degraded voltage protection,1 8 the entire backfitting discussion included in the draft RIS consists of three sentences. Of those three sentences, only one provides any analysis: > Specifically, NRC Staff technical positions outlined in this draft RIS are consistent with the aforementioned regulations [GDC 17] and generic communications [1977 letter, Generic Letter 79-36, BTP PSB-1], while providing more detailed discussion concerning the necessary voltage calculations supporting DVR settings based only on voltage requirements of Class **1E** components and the Class **1E** distribution system design.19 This analysis misses the point. First, GDC 17 (like most GDC) is cast in broad, general terms; therefore, the fact that the specific positions discussed in the draft RIS are "consistent with" the design criteria does not necessarily mean that they escape the definition of a backfit. Specifically, there are any number of staff positions that are "consistent with" a broad design principle, but the relevant inquiry when examining the backfit definition is whether the staff position being articulated is new or different from a previously applicable staff position. The draft RIS does not address this issue. Further, as discussed above, the generic communications and guidance discussed in the draft RIS are not completely consistent with one another and were not equally relevant in developing the licensing bases for all reactor licensees. Given the variability in the protection schemes approved by the NRC, merely concluding that the positions provided in the draft RIS are "consistent with" one or more of these documents, does not address the obvious fact that "providing more detailed discussion" on how to demonstrate compliance with GDC 17 could constitute a staff position that is new or different from a previously approved protection scheme.	Disagree The details of the inspection findings and enforcement actions are discussed in detail in the applicable inspection reports and TIAs, if applicable referenced in the RIS. NRC staff asserts that the regulations and staff positions articulated in the RIS are consistent with the regulations and existing guidance documents and therefore do not constitute new or different positions with respect to the backfit rule (50.109).
97	General	PPL	Page 1-2, First Bullet Contrary to the stated intent, PPL believes that the RIS does transmit new requirements and staff positions. Specific comments applicable to Susquehanna Steam Electric Station (SSES) are as follows: > The RIS introduces the need to consider both "starting and running" conditions during all operating configurations while maintaining the offsite power supply connected to the plant electrical distribution system. The establishment of a degraded voltage relay (DVR) to detect a "sustained" degraded voltage condition challenges the relay's basis for	Disagree The NRC 1977 letter states that “voltage and time setpoints shall be determined from an analysis of the voltage requirements of the safety related loads”. Safety related equipment, particularly large motors, have starting and running “voltage requirements”. This second level of protection must address these “voltage requirements”. Sustained degraded voltage, as discussed in the 1977 letter, refers to grid voltage below the expected low value given normal grid operation and grid post contingency. Thus, when grid voltages are degraded (such as resulting in SR bus voltages down close to

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			"protection" if its actuation (dropout) setpoint must accommodate both starting and running voltage conditions. The term "sustained degraded voltage" implies a steady state degraded voltage condition, and excludes starting voltage consideration	where DVRs are set based on SR equipment requirements), separation from the grid is appropriate. The design of the plant electrical distribution system and setting of the DVRs, based on the grid voltage range (described above) should provide proper margin such that spurious separation from the grid should not occur due to sequencing or block loading of loads during a design basis events.
98	Page 6, Section 1	PPL	Page 2, Paragraph 2 RIS 201 1-XX, Page 6, Section 1. "Degraded Voltage Relaying Design Calculations" contains the statement "staff considers degraded voltage condition coincident with a postulated design basis accident to be a credible event." This statement implies a requirement to demonstrate capability of connected loads to start and run at the degraded voltage relay dropout setting. For Susquehanna, sequencing of loads from the offsite power source cannot be demonstrated at the relay dropout setpoint because operation at this voltage level would result in separation from the offsite transmission system. Furthermore, the statement on page 6 of the RIS is not in agreement with other regulatory position documents such as GSI 171, "Engineered Safety Features Failure (ESF) from a Loss of Offsite Power (LOOP) subsequent to a Loss of Coolant Accident (LOCA)," which concluded a degraded voltage condition coincident with a postulated design basis accident is not a credible event.	Disagree NRC Staff asserts that this statement means that while the events are coincident (which is important from the standpoint that the time delay chosen for the DVR must support the accident analysis), it does not mean that connected loads must start and run at the dropout setting. The dropout setting must developed based on the voltage requirements (starting and running) and therefore to develop values which are bounding, the studies must be done under worst starting and loading conditions which means the required voltage at the 1E bus prior to the start or run case would have to be higher than the setpoint. The main point is that the setpoint must equate to the limiting voltage at the limiting component during the bounding starting or running scenario to protect the 1E equipment.
99	Page 6, Section 1	PPL	Page 2, Paragraph 3 Additional clarification is necessary if starting transients must be included when determining the degraded voltage relay (DVR) dropout setpoint. This condition will increase the probability of separating from the offsite transmission system and increase the likelihood of a double sequencing event, which is a potential nuclear safety concern.	Disagree. Proper design of the plant electrical distribution system, given the operating range of the grid and the proper selection of DVR settings (based on the voltage requirments of the 1E equipment), should provide more than adequate operating margin, preventing unnecessary separation from offsite power.
100	Page 8, Section c)	PPL	Page 2, Paragraph 3 The RIS requires performance of analyses for an accident in the unit being analyzed and simultaneous shutdown of all other units at the station. This is not consistent with the present Susquehanna design and licensing basis, which is an accident on one unit followed by the safe shutdown of the second (non-accident) unit. The safe shutdown of the non-accident unit is considered a controlled shutdown, which follows automatic operation of the safety related loads on the accident unit. This accident response is also consistent with the NERC requirements for the design of the transmission system. The RIS should be revised to be in agreement with the current NERC requirements.	Disagree. This statement in the RIS is consistent with GDC 17, GL 79-36, and IEEE Standard 308-1971, “Class IE Electrical Systems,” Section 8, “Multi-Unit Station Considerations.
101	General	PPL	Page 2-3, First Bullet The draft RIS attempts to clarify the requirements for setting the DVRs based on the criteria established in the following three main documents: 1) NRC letters to licensees dated June 2 & 3, 1977, 2) Branch Technical Position (BTP), PSB-1 Revision 0, 3) Generic Letter 79-36, "Adequacy of Station Electric Distribution Systems Voltages" The guidance listed in the draft RIS is not	Disagree. The 77 Letter was a Multi-plant Action B-23 applied to all operating reactors at that time and plants licensed since and it supplemented the requirements in 10 CFR Part 50, General Design Criteria 17 (GDC 17). In addition, NRC’s staff position is that while the BTP’s go into some more detail, they are consistent with the 77 Letter in the requirements of the 77 Letter are met.

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			consistent with all the requirements listed in these three documents and a new interpretation is provided in some cases. It should be generally recognized that a nuclear plant operating license may not have been issued based on the above documents. For example, the 1977 letters discussed above are not applicable to SSES.	
102	General	PPL	Page 3, First Bullet The lack of regulatory clarity in the RIS could result in revising the degraded voltage setpoint for a plant's DVR thus increasing the possibility of premature separation from the offsite circuit (i.e., undervoltage relay actuation). This relay operation could lead to an increase in the likelihood of a double sequencing event, which has the potential to create a nuclear safety concern.	Disagree. Proper design of the plant electrical distribution system, given the operating range of the grid and the proper selection of DVR settings (based on the voltage requirments of the 1E equipment), should provide more than adequate operating margin, preventing unnecessary separation from offsite power.
103	General	PPL	Page 3, Second Bullet The RIS introduces the need for two sets of calculations, one to establish the DVR relay setpoint and one for the interface with the offsite transmission system. The RIS should not specify the number of calculations that are necessary for a plant to meet a regulatory requirement.	Disagree. The RIS is primarily identifying that different types of calculations are necessary to address different requirements. DVR setting calculations consider the voltage of the 1E equipment while the plant design is more about the operating range of the grid and the resulting voltages in the plant system (which should be well above the DVR voltages)
104	General	PPL	Page 3, Third Bullet The condition the DVR is required to "protect" needs to be specifically defined along with the applicable relay setting, (i.e., relay minimum dropout, maximum dropout, or reset). If the DVR is installed to provide a level of protection then the analysis must demonstrate that the safety related equipment is capable of performing its required safety function. An example of this would be the case where the DVR analysis would need to demonstrate acceptable operation at both the starting and running equipment ratings when at the DVR dropout setting.	Disagree. The DVR's function is specifically specified in that it ensures that 1E equipment is supplied with adequate voltage in accordance with its design requirements.
105	General	PPL	Page 3, Fourth Bullet A clarification of the term "sustained" is needed to determine if "sustained" refers to a steady state voltage condition (i.e., no equipment starting voltage effects) for which the DVR setting is to be established.	Disagree. Sustained degraded voltage, as discussed in the NRC 1977 letter as well, refers to grid voltage below the expected low value given normal grid operation.
106	General	PPL	Page 3, Fifth Bullet The guidance in the RIS is too general when referring to operating voltages. The specific voltage requirements need to be specified instead of implied by a general term. The RIS needs to clarify that the impact of the nuclear unit trip on the transmission system voltage must be considered in the plants voltage analysis.	Disagree. The term voltage requirements used in the RIS is defined in terms of equipment manufacturer design requirements. NRC Staff feels that this terminology is sufficiently specific. Additional wording has been added to the RIS draft to better enforce that idea that unit trip voltage impact must be factored into the accident analysis cases.
107	General	PPL	Page 3, Sixth Bullet The time delays suggested are not consistent with PSB-l. The PSB established one time delay to allow for operator action. The RIS does not address this requirement.	Disagree. While there may differences, the BTPs are guidance documents and represent an approach but not necessarily the only

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				approach. In addition, following the guidance documents approach will satisfy the GDC and the 77 Letter's requirements.
108	General	PPL	Page 4, First Bullet The RIS also lacks any acknowledgement of preventative measures the licensees have taken to minimize the potential for a degraded voltage condition. Advancements in plant loadflow analyses and measures to increase the reliability of the offsite transmission system are industry improvements that have occurred since the degraded voltage events that occurred 35 years ago.	Disagree. Regardless of improvements made in terms of grid operation and understanding of grid operation's impact on plant voltages, the plant design has always had to properly address grid operating parameters and their impact on plant voltages in all modes of operation. The was the point properly emphasized in the RIS as was in the original regulations and guidance.
109	General	APS	Page 2, 1. The draft RIS asserts that there is a simple and singular set of design criteria that have been applied universally to the industry. Over the years the degraded voltage performance requirements have changed, as a specific issue, and on a component basis (e.g., motor operated valves and contactors), for individual nuclear power plants. As a result, each nuclear power plant has specific licensing bases, and there is no singular set of requirements that have been applied universally to the industry.	Disagree. The 77 Letter reflects the design criteria in that the voltage requirements for the 1E equipment has to be ensured by the DVR circuits by automatic separation from offsite and transfer to the onsite sources.
110	General	APS	Page 2, 2. The draft RIS asserts that the guidance provided to the industry to address the Millstone and other degraded voltage events adequately addresses this potential common mode failure. The common mode failure potential is that multiple trains of safety equipment could be simultaneously negatively impacted if off-site power is degraded. The deterministic guidance provided does not appear to effectively address integrated plant response nor preclude a Millstone type event. The use of degraded voltage relays to address this potential failure mode is not consistent with operating experience and lacks adequate technical basis as described in the detailed technical comments that follow.	Disagree. The DVR circuits will automatically separate the 1E circuits from offsite power when voltage requirements are not met which will prevent the Millstone type event automatically.
111	Page 6	APS	Page 2, 3. The draft RIS (page 6 of 10) states: "The staff considers degraded voltage conditions coincident with a postulated design basis accident to be a credible event." It is our understanding that the established staff interpretation is that this is not a credible event, as discussed and supported by analysis in NUREG-0933, Supplement 33, dated August 2010, *Resolution of Generic Safety Issues,* Issue *171, ESF Failure from LOOP Subsequent to a LOCA,* and Brookhaven National Laboratory NUREG/CR-6538 (BNL-NUREG-52528), *Evaluation of LOCA With Delayed Loop and Loop With Delayed LOCA Accident Scenarios, Technical Findings Related to GSI-1 71, 'ESF Failure from LOOP Subsequent to* LOCA' published July 1997. This appears to be a new staff interpretation and no documented analysis is provided to support it. Therefore, if the scenario is credible, as the draft RIS asserts, then GSI-171 is not adequately resolved and should be reevaluated.	Disagree The point being made in the RIS is that setting of the DVR requires consideration of a coincident accident signal in that the time delay chosen for the DVR must support the accident analysis assumptions in accordance with the NRC1977 letter.

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112	General	APS	Page 5, 4. The recent licensing actions in the industry which have mandated setpoint changes for the degraded voltage relays (DVRs) and loss of voltage relays (such as the one cited in the draft RIS for Fermi-2) only serve to increase the probability of the 'ESF Failure from LOOP Subsequent to a LOCA' event discussed in NUREG/CR-6538 without providing an advantage for any credible scenario. As such, these changes may increase core damage frequency (CDF). It is APS's understanding that a comprehensive review of guidance related to degraded grid voltage has not been performed using the cost-benefit and risk criteria of 10 CFR 50.109 (backfit rule), nor is it apparent that risk insights have been used to inform this guidance.	Disagree Setting the DVRs in accordance with the voltage requirements of the 1E equipment coupled with a properly designed plant electrical distribution system (and based on the grid's allowable voltage range) must provide adequate voltage margin to preclude offsite separation. Disagree NRC staff asserts that the regulations and positions articulated in the RIS are consistent with the existing regulatory requirements and NRC staff positions and therefore do not constitute new or different positions with respect to the backfit rule (50.109).
113	General	APS	Page 5, 5. The draft RIS does not address the implication of the Branch Technical Position (BTP) PSB-1 requirement that "The Class 1 E bus load shedding scheme should automatically prevent shedding-during sequencing of the emergency loads to the bus." A large variety of voltage conditions could exist during the sequencing period while the shedding is blocked, and no analytical methods are discussed that could demonstrate that equipment damage or malfunction would not occur.	Disagree. The design of the plant electrical distribution system and the onsite sources should provide for adequate voltage to all 1E equipment in all normal, abnormal and accident conditions. Typical designs do not block the DVR or the LOV relay when sequencing loads on the offsite source. Hence load shedding in the event of a loss of offsite power should be part of the design basis. A large variation of voltage conditions can occur during various operating modes of a nuclear plant. The DVR setpoint should be based on limiting conditions. If the recommendations of BTP PSB-1 are followed, the probability of events such as double sequencing is minimized.
114	Page 7	APS	Page 5-7, 6. In light of the summary of the resolution of GSI-171, the draft RIS statement (page 7 of 10) that "(t)he time-delays(s) chosen for DVRs during accident conditions should meet the accident analysis assumptions..." does not seem appropriate. The degraded voltage condition could occur at various times during the initial energization of the accident mitigation equipment, and the relay time delay value only affects the additional time until the subsequent LOOP occurs.	Disagree. Degraded voltage conditions can be postulated to occur at anytime. The DVR setpoint should accommodate the limiting case for equipment protection. If the recommendations of BTP PSB-1 are followed, then a separation from the degraded grid coupled with accident signal is the preferred approach to resolve the issue and satisfy accident analyses.
115	Page 8	APS	Page 7-8, 7. It is not feasible for multi-unit nuclear plants to successfully demonstrate that voltage from the offsite circuits would be adequate, as described in the draft RIS (page 8 of 10), for: "(1) an accident in the unit being analyzed and simultaneous shutdown of all other units at the station; or (2) an anticipated transient (anticipated operation occurrence) in the unit being analyzed (e.g., unit trip) and simultaneous shutdown of all other units at that station." North American Electric Reliability Corporation (NERC) Standard TPL-004 recognizes that the design and operating constraints of the transmission network are such that the loss of all generating units at a station could result in portions	Disagree This wording in the RIS is the same as was used in GL 79-36. TPL-004 requires transmission planning to address simultaneous multiple transmission contingencies. The requirements of TPL-004 are not within the scope of RIS.

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			or all of the interconnected system not achieving a new, stable operating point. It is beyond the nuclear plant operator's authority or capability to ensure otherwise.	
116	Page 6	APS	Page 8, 8. The draft RIS (page 6 of 10) contains the following statement: "The Class **I** E buses should separate from the offsite power system within a few seconds if an accident occurs coincident with sustained degraded voltage conditions." This statement appears to reflect the position of Revision 3 of BTP 8-6, which states, in part: "The first time delay should be long enough to establish the existence of a sustained degraded voltage condition (i.e., something longer than a motor-starting transient). Following this delay, an alarm in the control room should alert the operator to the degraded condition. The subsequent occurrence of a safety injection actuation signal (SIAS) should immediately separate the Class 1 E distribution system from the offsite power system. In addition, the degraded voltage relay logic should appropriately function during the occurrence of an SIAS followed by a degraded voltage condition." This is not currently a design or licensing requirement for all existing plants. As such the RIS process would not be the appropriate method to communicate a new regulatory position.	Disagree. As a result of these Millstone events, the NRC required all licensees to implement degraded voltage protection under a 1977 Generic Action (Multi-plant Action B-23) to ensure automatic protection of safety buses and loads. Multi-plant Action B-23 applied to all operating reactors at that time and plants licensed since and it supplemented the requirements in 10 CFR Part 50, General Design Criteria 17 (GDC 17).
117	Page 6	APS	Page 8-9, 9. The draft RIS (page 6 of 10) contains the following statement: "The time delay chosen should be optimized to ensure that permanently connected Class **1** E loads are not damaged under sustained degraded voltage conditions (such as sustained degraded voltage just above the LVR voltage setting for the duration of the DVR time delay setting)." This deterministic approach, while appearing conservative, has the net effect of increasing the frequency of delayed LOOP events during transients, even when the subsequent sustained voltage condition is not degraded (see Comment 4), with resulting adverse effects as discussed in the resolution of GSI-171. It also neglects consideration of the voltage levels that must be maintained in the event of a unit trip and coincident	Disagree The voltage studies done for evaluating offsite power/onsite power interface should use minimum expected voltage at the plant/grid interface node, demonstrating adequate voltage for starting and running of plant components during normal, abnormal and accident conditions. The voltage studies

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			accident to prevent delayed LOOP events. Finally, the draft RIS is silent on the particulars of the voltage studies that would be acceptable to use to determine the optimum time delay (such as the plant operating conditions and voltage profile).	for the DVR setpoints should require plant/grid interface node voltages well below the minimum expected values (including post grid contingency).
118	Page 6	APS	Page 9, 10. The *DVR Setting Design Calculations* section (page 6 of 10) indicates that: "models would allow calculation of voltages at terminals or contacts of all safety related equipment with the voltage of the DVR monitored bus at the DVR dropout setting, providing the necessary design basis for the DVR voltage settings. In this manner, the DVR ensures adequate operational (starting and running) voltage to all safety related equipment, independent of voltage controlling equipment external to the plant safety related electrical distribution system." This seems to impose a new requirement. Further, the described model is of a nondegraded voltage scenario that does not result in DVR actuation. Therefore, it does not demonstrate that "required safety related components are provided adequate voltage" for accidents with degraded voltage scenarios. That conclusion could only be demonstrated by modeling degraded voltage scenarios that involve DVR actuation. However, in all cases involving degraded voltage coincident with postulated accidents, such models would result in delayed LOOP scenarios as discussed in GSI-171. Also, it reflects a non-conservative voltage profile. If the voltage at the DVR monitored bus was at the DVR dropout setting prior to starting a motor, it would be lower than that during and after starting the motor, and the voltage at the motor terminals would be correspondingly lower, as well, compared to the results using the constant bus voltage methodology described in the draft RIS.	Disagree The DVR dropout setting must developed based on the voltage requirements (starting and running) and therefore to develop values which are bounding, the studies must be done under worst starting and loading conditions which means the required voltage at the 1E bus prior to the start or run case would have to be higher than the setpoint. The main point is that the setpoint must equate to the limiting voltage at the limiting component during the bounding starting or running scenario to protect the 1E equipment. The RIS does not impose any new requirements. It provides clarification on existing requirements. The DVR setpoint should be optimized for motor starting transient and protection of safety related equipment.
119	Page 5	APS	Page 10, 11. The draft RIS discussion asserts that the NRC Office of Nuclear Reactor Regulation (NRR) Task Interface Agreement (TIA) response (TIA 2010-05) "concluded ... the time delay to transfer from a degraded offsite source to the standby power source to support the emergency core cooling equipment operation must be consistent with accident analysis time assumptions, as required by BTP PSB-1 (NUREG 0800)." This statement is not included in the TIA response. The TIA response (pages 4 and 5) quotes the Palo Verde UFSAR description for the design requirements of the degraded voltage relays, and this specific time delay provision is not included in the PVNGS UFSAR. This specific time delay provision was removed as part of the PVNGS license amendment 123 process and was specifically addressed in the NRC and APS correspondence (NRC Letter dated June 14, 1999, and APS letter dated July 16, 1999, Question 13). The subject matter of the TIA did not	Disagree The point being made in the RIS is that setting of the DVR requires consideration of a coincident degraded grid and accident in that the time delay chosen for the DVR must support the accident analysis assumptions in accordance with the NRC1977 letter. Task Interface Agreement 2010-005 (ADAMS Accession No. ML102800340) provides more details regarding Palo Verde degraded voltage inspection finding. Plant specific findings are not in the scope of

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			include the time delay element of the design, with regard to the accident analysis time assumptions, but rather was focused upon whether license amendment 123 bounded the need to perform design basis electrical calculations for the degraded voltage relay low setpoint value of 3697 volts or below.	the RIS.
120	Page 5	APS	Page 10-11, 12. The draft RIS asserts that PVNGS erroneously maintains that a degraded voltage condition concurrent with a design basis accident is not credible. PVNGS had originally implemented the design approach included in the NRC letter Qualification Review of the PVNGS Units 1,2 and 3, dated December 12, 1977. Based on operating experience (LER 50-528/529/530-93-011)-and site specific license amendment 123, PVNGS took action to preclude such an event, by implementing new TS LCO 3.8.1, Condition G. This approach was consistent with the resolution of GS1-171, alternative 3, and was approved. The prevention strategy was implemented to preclude a concurrent degraded voltage condition and design basis accident because the PSB-1 type design is not capable of adequately coping with such an event. All such events would result in delayed LOOP/double sequencing scenarios, as described in GSI-171, for which there is no viable analytical approach.	Disagree. The point being made in the RIS is that setting of the DVR requires consideration of a coincident degraded grid and accident in that the time delay chosen for the DVR must support the accident analysis assumptions in accordance with the NRC1977 letter. The licensee must ensure that SI actuation at a point just above the DVR set point should not cause double sequencing. See staff response to Task Interface Agreement 2010-005 (ADAMS Accession No. ML102800340) for more details regarding Palo Verde degraded voltage inspection finding.
121	Page 5	APS	Page 11, 13. PVNGS originally implemented the second level degraded voltage protection design consistent with NRC letter Qualification Review of the PVNGS Units 1, 2 and 3, dated December 12, 1977. As a result, reference to PSB-1 in the draft RIS for PVNGS does not reflect the historic licensing basis for PVNGS.	Disagree The licensee's analysis must show that degraded voltage trip setpoint adequately protects the equipment powered by the 4.16 kV ESF bus from a potentially damaging degraded voltage condition. The NRC regulatory requirement is Criterion 17 of Appendix A to 10 CFR 50. The NRC staff guidance and positions are described in PSB-1. See staff response to Task Interface Agreement 2010-005 (ADAMS Accession No. ML102800340) for more details regarding Palo Verde degraded voltage inspection finding.

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122	Page 5	APS	Page 11, 14. Inspection Report 2009-008 is described in the draft RIS. The specific elements of the inspection report that require response are next described. The inspection report states: "the time delay of 35 seconds for transfer of safety buses to the onsite power supplies may be too long to prevent core damage in case of a sustained degraded voltage condition concurrent with an accident. This time delay could result in a delay in supplying water to the core in case of an accident concurrent with degraded voltage, due to the inability of electrical equipment to respond as required during the timeout period." APS Response: This is a double sequencing scenario, which is a malfunction of an SSC with a different result than previously evaluated pursuant to 10 CFR 50.59, for PVNGS. It could result in core damage regardless of the time delay value at which the DVR actuation (delayed LOOP) occurs. This is the reason APS precludes such an event by establishing appropriate initial conditions, with TS LCO 3.8.1, Condition G, through license amendment 123.	Disagree. The point being made in the RIS is that setting of the DVR requires consideration of a coincident degraded grid and accident in that the time delay chosen for the DVR must support the accident analysis assumptions in accordance with the NRC1977 letter. The focus of the RIS is to clarify regulatory requirements. See staff response to Task Interface Agreement 2010-005 (ADAMS Accession No. ML102800340) for more details regarding Palo Verde degraded voltage inspection finding. The double sequencing issue is a plant-specific issue. The staff determined that the amendment that addressed the specific design issue (double sequencing) at PVNGS did not change the licensing requirements for the degraded voltage protection at PVNGS.
123	Page 5	APS	Page 11-12, 15. The inspection report states: "A shorter time delay will not delay the time required to provide water to the core, but will actually improve it." APS Response: APS is not aware of any analysis in the GSI-171 resolution document to suggest that a shorter time delay (e.g., delayed LOOP occurring sooner) would be of any benefit in preventing the failure mechanisms associated with a delayed LOOP or assuring that water would be successfully provided to the core. See Technical Comment 6 for further discussion on the lack of correlation between the DVR time delay setting, accident analysis time, and core damage. The PVNGS current licensing basis for the DVR time delay is > 28.6 seconds. During the review that led to issuance of PVNGS license amendment 123, the staff expressed a concern that a minimum allowable time delay be specified to assure that unnecessary separation from offsite power would not occur. The safety evaluation for license amendment 123 states:	Disagree This is a plant specific issue. The issue will be reviewed through the ROP.

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			"APS responded by adding a lower limit (> 28.6 seconds) to the time delay allowable value specified for the degraded voltage function in its revised submittal dated September 29, 1999. This change resolves the staffs concern on this matter." The NRC staff was aware and approved the existing time delay values for the DVRs and the staff considered a shorter time delay to be a concern. The inspection report is inconsistent with the current safety evaluation.	
124	Page 5	APS	Page 12, 16. The inspection report states: "The licensee had offered the proposition that degraded voltage concurrent with an accident was not credible, but the team could not find evidence that the NRC had accepted this position, or that the degraded voltage relays were no longer required to perform a protective function during accidents." **APS** Response: The PVNGS current licensing basis is documented in the safety evaluation for PVNGS license amendment 123, which states: "The licensee's proposed revision to TS 3.8.1, Condition G is designed to preclude a degraded voltage/double sequencing scenario from occurring at the Palo Verde site. The staff finds this approach acceptable...." The safety evaluation recognizes that the prevention strategy precludes degraded voltage conditions from occurring. All scenarios involving degraded voltage concurrent with an accident are delayed LOOP/double-sequencing scenarios. The purpose for PVNGS license amendment 123 was to implement a method to prevent this degraded voltage concurrent with an accident (which would always result in a delayed LOOP and double sequencing). APS is not aware of an accepted method to ensure that core damage will not result, if such an event were to occur. Design basis calculations to justify the function of the degraded voltage relays during accidents are not feasible, because they would be unable to justify the delayed LOOP/double sequencing effects discussed in GSI-171.	Disagree. See staff's response to Comment No. 123
125	Page 6	Nextera 1	This paragraph could be interpreted to require the LOCA sequence to be modeled at the DVR dropout setting. LOCA sequencing modeled at the DVR dropout setting would result in separation of the buses from the Preferred Power Source (off-site power) as the voltage would not recover above the DVR reset value. Clarify the intent is to show safety related equipment will function at the selected DVR dropout setting voltage and that it is not expected to start the LOCA sequence from this voltage level. Clarify that LOCA sequencing is evaluated using minimum switchyard voltage as starting point.	Disagree The dropout setting must developed based on the voltage requirements (starting and running) and therefore to develop values which are bounding, the studies must be done under worst starting and loading conditions which means the required voltage at the 1E bus prior to the start or run case would have to be higher than the setpoint. The main point is that the setpoint must equate to the limiting voltage at the limiting component during the bounding starting or running scenario to protect the 1E equipment.
126	Page 6	Nextera 2	Having a sustained degraded voltage just above the LVR voltage setting (70%) is not practical without grid collapse and does not exist in Branch Technical Position #1 (PSB-1).	Agree. The DVR setpoints are calculated based only on the voltage requirements of the 1E

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			Clarify degraded voltages to be analyzed to a credible level.	equipment, not based on whether the grid can sustain voltage at levels that result in such conditions.
127	Page 6	Nextera 3	The statement that the DVR ensures adequate operational (starting and running) is the first time in NRC correspondence that starting equipment at the DVR setpoint is expected. The example letter sent to Peach Bottom in June 1977 did not require starting of equipment at the DVR setpoint. This requirement should be removed from the RIS since it is not possible to start equipment at the DVR setpoint and not subsequently separate from offsite power. If the equipment starts at the DVR setpoint, the voltage will dip during the transient and must then recover above the reset point to avoid separation from offsite power. Since the reset point will always be above the DVR dropout point it will be impossible to reset the relay. Remove starting of equipment at the DVR setpoint as a requirement.	Disagree The dropout setting must developed based on the voltage requirements (starting and running) and therefore to develop values which are bounding, the studies must be done under worst starting and loading conditions which means the required voltage at the 1E bus prior to the start or run case would have to be higher than the setpoint. The main point is that the setpoint must equate to the limiting voltage at the limiting component during the bounding starting or running scenario to protect the 1E equipment.
128	Page 7	Nextera 4	It is agreed that no credit is to be taken for voltage controlling equipment external to the Class 1 E distribution system for the establishing the degraded voltage relay (DVR) settings; however, it should be clarified that for credit may be taken for minimum switchyard voltage/voltage drop calculations (or the Offsite/Onsite Design Interface Calculations). Clarify that credit may be taken for automatic load tap changers and/or capacitor banks for minimum switchyard voltage/voltage drop calculations (or the Offsite/Onsite Design Interface Calculations).	Agree Additional wording has been added to the Offsite/Plant distribution discussion to make it more clear that equipment like automatic load tap changers can be credited if the response time will support normal operation.
129	Page 8	Nextera 5	NRC Generic Letter 79-36, Enclosure 2, Item 2 states that It is recommended that *"For multi-unit stations a separate analysis should be performed for each unit assuming (1) an accident in the unit being analyzed and simultaneous shutdown of all other units* "Offsite/Onsite *at the station; or (2) an anticipated transient in the unit being* Design *analyzed (e.g., unit trip) and simultaneous shutdown of all* Interface *other units at that station, whichever presents the largest* Calculations", *load situation."* Comment: NRC Draft RIS re-states NRC GL 79-36 verbatim, with an attempt to clarify *"anticipated transient'* by adding in parenthesis *"(anticipated operational occurrence)"* immediately afterwards. It is not clear what the added parenthetical statement is meant to convey, other than unit trip (which already exists in GL 79-36). It is recommended that this either be removed, or stated *"anticipated transient per station licensing basis".*	Disagree The reference added is the wording used in GDC 17 (for consistency).
130	Page 8	Nextera 6	NRC should clarify "simultaneous shutdown" with	

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			consideration to: Most multi-unit station's Licensing Basis consider an "orderly or controlled safe shutdown" of the other unit(s) not being analyzed. NERC Std TPL-004-0; particularly Category D events per Table 1, where a *"loss of all generating units at a station"* may result in *"portions or all of the interconnected systems may or may not achieve a new, stable operating point'*. IEEE Std 308-1974, Clause 8, subclause 8.1.1 "Capacity' describes this as a "concurrent safe shutdown on the remaining units". The wording for the proposed RIS, subclause 2.c should be revised to indicate "orderly or controlled safe shutdown of the remaining units, as per the station's licensing basis" instead of "simultaneous shutdown". Alternatively, the wording "shutdown consistent with the station licensing basis" could be used instead of "simultaneous shutdown".	Disagree This wording in the RIS is the same as was used in GL 79-36. TPL-004 requires transmission planning to address simultaneous multiple transmission contingencies. The plant licensing basis provides basis for analyses related to multi unit sites.
131	Page 8	Nextera 7	These guidelines (e) and f))seem contradictory that you cannot credit procedurally controlled operator actions to reduce load but you have to assume the actions will be carried out when load is added. Delete "e) Manual load shedding should not be assumed" or add allowance to credit procedurally controlled operator actions to decrease load.	Disagree. These guidelines are not contradictory in that one is considering load shedding (not conservative) for design of system based on maximum load, while the other is about load additions which occur per procedure (conservative for maximum loading design).
132	General	TVA	Comment: The RIS suggests that demonstrating adequate motor starting voltage is a reasonable objective or outcome of a setpoint calculation for a Degraded Voltage Relay whose purpose is to protect Class 1 E equipment. TVA's position is that such an objective or outcome is not technically achievable for the reasons discussed below: 1) A Voltage Relay is not a Predictive Device Voltage sensing equipment cannot provide a predictive function without crediting the capacity or capability of the upstream system, since it cannot determine the capacity or capability provided during a transient condition such as a motor start. Since the existing regulatory framework for degraded voltage protection was based on use of voltage relaying, it is not clear how the existing relaying equipment could be used to demonstrate compliance with an adequate motor starting demonstration requirement. 2) A Degraded Voltage Relay Protection Setpoint Based on Starting Voltage Does Not Provide Motor Protection This method could potentially be calculated but would mean that the DVR setpoint would have been determined during the starting of the most limiting Class-I E motor. A degraded voltage relay setpoint based on a motor starting would not protect the motor from damage (required by regulations) or preclude tripping of the motor's	Disagree The DVR dropout setting must developed based on the voltage requirements (starting and running) and therefore to develop values which are bounding, the studies must be done under worst starting and loading conditions which means the required voltage at the 1E bus prior to the start or run case would have to be higher than the setpoint. The main point is that the setpoint must equate to the limiting voltage at the limiting component during the bounding starting or running scenario to protect the 1E equipment. In addition, the time delay would be determined based on the limiting starting transient duration only (not based on allowing time for operator action). In this manner, if the voltage drops below expected values during starting (based on the 1E equipment limits) and prolongs the start transient, then the DVR will timeout and separation will occur (providing low starting voltage protection).

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			over-current device(s) prior to transferring to the onsite power supply (required by regulations). This is because the DVR time delays are (by definition) required to be longer than a motor starting transient (1st time delay) and long enough to allow operator intervention (2nd time delay). If starting of the limiting (worst-case) motor was attempted in a true degraded voltage situation (even *slightly* below the DVR setpoint), the DVR scheme could not perform either of these protective functions prior to tripping the normal overcurrent relays. Therefore, this would not provide any additional protection for the Class-1 E loads.	
133	General	Progress Energy 1	Background: The draft NRC Regulatory Issue Summary, 2011 -xx, Adequacy of Station Electric Distribution System Voltages, describes a methodology of implementation for degraded voltage relay schemes that would impose "Additional Conservatisms" into the settings and time delays in an effort to further reduce the risk of degraded voltage operation on nuclear plant safety related / accident mitigating electrical equipment. "Additional Conservatisms" from this point of view tends to mean that the degraded voltage relaying will actuate earlier in a degraded voltage event time line - meaning it would be set to actuate at a higher degraded voltage and/or with a shorter time delay. In conflict with the NRC's desire to impose additional conservatisms on degraded voltage protection at nuclear power plants, the North American Electric Reliability Corporation (NERC), is developing a national standard for Frequency and Voltage Excursion Ride- Through Performance (PRC-024) for all generating stations in North America. The Voltage Excursion Ride-Through Time Duration Curves currently proposed by the NERC Standards Drafting Team shows the competing desire for nuclear power plants to be capable of riding through a grid induced voltage transient without tripping. Actuation of the degraded voltage relaying in a nuclear power plant during a grid induced voltage transient results in a temporary loss of power to the safety related loads powered from the plant buses until the loads are realigned to an emergency power source and reenergized. This temporary loss of power will result in a trip of the nuclear plant in many cases and a significant challenge to continued operation of the plant in all cases. An analysis of current settings and time delays for several nuclear plant loss-of-voltage and degraded voltage relay schemes against the proposed NERC ride through criteria shows that existing settings are already in conflict with the proposed ride-through criteria. Imposition of additional conservatisms into the relay settings and time delays for nuclear plant equipment degraded voltage protection will further complicate efforts to coordinate NRC required degraded voltage protection schemes with NERC voltage transient ridethrough capability needs.	Disagree. Additional conservatism should not be added for the sake of adding conservatism. Conservatism is typically added to compensate for assumptions that cannot be accurately verified or proven (e.g. cable impedances when actual pull lengths are not known. . NERC and FERC guidelines are reviewed by NRC staff for applicability to nuclear plant operation. The DVR and loss of voltage relay settings should not be in conflict with NERC or FERC recommended guidelines for grid operations.

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			Comment: Please coordinate NRC Staff proposed degraded voltage relay setting methodology changes with NERC proposed voltage transient ride-through capability standard (PRC-024) by engaging with NERC under the current NRC - NERC Memorandum of Agreement (MOA).	
134	General	Progress Energy 2	Background: The use of on-load automatic load tap changing transformers for nuclear plant offsite power supplies would aid in minimizing auxiliary bus under voltage or degraded voltage transients of concern to the NRC while also improving the voltage transient ride through capability of the nuclear plants that is of concern to NERC. Comment: Please revise the RIS to allow the nuclear plants to use and take credit for on load automatic load tap changing transformers for nuclear plant offsite power supplies to prevent degraded voltage events and improve the voltage transient ride through capability of the nuclear plants.	Agree Load tap changers help improve voltage regulation for normal plant operation. Load tap changers do not help protect safety related equipment during degraded grid conditions. Additional wording has been added to the Offsite/Plant distribution discussion to make it more clear that equipment like automatic load tap changers can be credited for normal plant operation.
135	General	Progress Energy 3	Comment: Please also consider the *italicized* changes below: DVR Setting Design Calculations Licensee voltage calculations should provide the basis for their DVR settings, ensuring safety related equipment is supplied with adequate operating voltage (typically a minimum of 0.9 per unit voltage at the terminals of the safety related equipment per equipment manufacturers requirements), based on bounding conditions for the most limiting safety related load (in terms of voltage) in the plant. These voltage calculations should model the plant safety related electrical distribution system such that the limiting voltage at the bus monitored by the DVR can be calculated in terms of the voltage at the terminals of the most limiting safety related component in the plant. These models would allow calculation of voltages at terminals *(delete "or contacts* ") of all safety related equipment with the voltage at the DVR monitored bus at the DVR dropout setting, providing the necessary design basis for the DVR voltage settings. In this manner, *independent of voltage controlling equipment external to the plant safety related electrical distribution system,* the DVR ensures *that* all safety related equipment *can continue to operate at the degraded voltage relay drop out setting if previously in service, small loads will not be damaged if successfully started at the degraded voltage without DVR time out (the DVR either does not drop out or resets before time out because the started load is small), and larger loads will not be damaged or trip on overload /protective relaying if starting the equipment results in sustained degraded voltage for the duration of the DVR time delay (the DVR drops out and does not reset because the load is large but the DVR timer times*	Agree *Italicized* changes suggested were considered in terms of responses to similar comments brought by other parties in the RIS revision. “Contacts” was deleted.

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			out and sheds the load from the degraded voltage source before the overloads and/or protective relaying actuates). For the purposes of this *DVR Setting Design* calculation, no credit should be taken for voltage controlling equipment external to the Class 1 **E** distribution system such as automatic load tap changers and capacitor banks *because these devices normally prevent degraded voltage from occurring and thus, by definition, should not be included in a bottom up analysis to determine minimum voltage requirements for the safety related loads.* Voltage time settings for DVRs should be selected so as to avoid spurious separation of safety buses from the offsite power system during unit startup, normal operation and shutdown. These DVRs should disconnect the Class 1 E buses from any power source other than the emergency diesel generators (onsite sources) if the degraded voltage condition exists for a time interval that could prevent the Class 1 **E** safety related loads from achieving their safety function. The DVRs should also protect the Class 1 **E** safety related loads from prolonged operation below sustained degraded voltage which could result in equipment damage. The licensees should demonstrate that the existing DVR settings including allowable values and time delays are *adequate so that safety related loads can continue to operate at the degraded voltage relay drop out setting if previously in service, small loads will not be damaged if successfully started at the degraded voltage without DVR time out, and larger loads will not be damaged or trip on overload/protective relaying if starting the equipment results in sustained degraded voltage for the duration of the DVR time delay resulting in separation from offsite power and realignment to the emergency onsite power supply.* The time-delay(s) chosen for DVRs during accident conditions should *be short enough to* meet the accident analyses assumptions and allow for proper starting of all Class **1E** safety related equipment *assuming that the DVR time delay times out and the accident mitigating loads realign to the onsite emergency power supply.* Also, the time delay chosen for DVRs during non-accident condition must *be short enough to* not cause any degradation of the safety related components, including actuation of their protective devices.	
136	General	Progress Energy 3	Comment: Please also consider the *italicized* changes below: Offsite/Onsite Design Interface Calculations The offsite power source is the preferred source of power to safely shut down the plant during design basis accidents, abnormal operational occurrence, and reactor trips. The licensee's voltage calculations should provide the basis for proper operation of the plant safety related electrical distribution system, when supplied from the offsite circuit (from the transmission network). These calculations should demonstrate that the voltage requirements (both starting and operational voltages) of all plant safety related systems and components are satisfied based on operation of the	Agree *Italicized* changes suggested were considered in terms of responses to similar comments brought by other parties in the RIS revision.

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			transmission system and the plant onsite electric power system during *normal, startup, shutdown, accident mitigation, and alternate authorized* operating configurations of transmission network and plant systems. In this way, all safety related systems and components will function as designed with proper starting and running voltages during all plant conditions and the DVRs will not actuate (separating the transmission network supply). Following are guidelines for voltage drop calculations derived from Generic Letter 79-36, which have been supplemented to add clarifying information. They do not represent new NRC staff positions.	
137	General	Progress Energy 3	Comment: Please also consider the *italicized* changes below: Guidelines for voltage drop calculations a) The plant voltage analysis, while supplied from the transmission network, should be based on the operating voltage range of the transmission network connection. This transmission owner/operator supplied voltage range should address *normal, startup, shutdown, accident mitigation, and alternate authorized* transmission network and plant system operating configurations and should also include voltage drop due to the bounding worst case transmission system *single* contingency (transmission system contingencies include trip of the nuclear power unit). *Normally in-service and periodically tested non-safety related equipment (such as automatic load tap changing transformers that regulate voltage during changing conditions) are to be included in the analysis.* b) Separate analyses should be performed assuming the power source to the safety buses is (1) the unit auxiliary transformer; (2) the startup transformer; and (3) other available connections (e.g., from all available connections) to the offsite network one by one assuming the need for electric power is initiated by (1) an anticipated transient such as a unit trip (e.g., anticipated operational occurrence), or (2) an accident, whichever presents the bounding load demand on the power source.	Agree *Italicized* changes suggested were considered in terms of responses to similar comments brought by other parties in the RIS revision.
138	General	STARS	"Statement of Staff Positions Relative to Emergency Power Systems for Operating Reactors" RIS 201 1-XX states that "the NRC required licensees to install degraded voltage protection schemes ... as described in NRC Letters dated June 2 & 3, 1977, 'Statement of Staff Positions Relative to Emergency Power Systems for Operating Reactors,' which were sent to all licensees of all operating nuclear power plants. As an example, see the NRC letter dated June 2, 1977, ADAMS Accession No. ML100610489, sent to the licensee for Peach Bottom Atomic Power Station." (Ref. 2) However, the RIS does not recognize the latitude in response allowed to each	Disagree

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			Licensee: "We request that you compare the current design of the emergency power systems at your facility(ies) with the Staff Positions stated in the enclosure and: (1) propose plant modifications as necessary to meet the Staff Positions, or (2) provide a detailed analysis which shows your facility design has equivalent capabilities and protective features. Additionally, we require that certain technical specifications be incorporated into all facility operating licenses." Observations: 1. The NRC letters request some actions and require some actions - specifically – a technical specification change. 2. The response makes allowance for varied responses that account for "equivalent capabilities and protective features." These varied responses become part of the licensees' Current Licensing Basis. 3. Licensees were required to change their operating license because the staff position. However, this in and of itself, does not change the licensees' Current Licensing Basis. 4. The "1977" letters apply only to addressees, i.e., plants licensed before 1977. “Adequacy of Station Electric Distribution System Voltages” The technical content, with some modifications, of the "Statement of Staff Positions Relative to Emergency Power Systems for Operating Reactors" was put in the Branch Technical Position (BTP) of the Standard Review Plan (SRP/NUREG-0800), PSB-1, Revision 0, "Adequacy of Station Electric Distribution System Voltages," dated July 1981, and in the current BTP 8-6 of the SRP, Revision 3, "Adequacy of Station Electric Distribution System Voltages," dated March 2007. 1. Branch Technical Positions of NUREG-0800 are not requirements but: "represent guidelines intended to supplement the acceptance criteria established in Commission Regulations, guidelines presented in Regulatory Guides, and recommendations presented in applicable IEEE standards." 2. PSB-1 and BTP 8-6 provide subtle but significant changes to each other and to the original "Statement of Staff Positions Relative to Emergency Power Systems for Operating Reactors" (Note: these differences will be provided in a comment letter from the Nuclear Energy	NRC staff does not agree with this position. As a result of these Millstone events, the NRC required all licensees to implement degraded voltage protection under a 1977 Generic Action (Multi-plant Action B-23) to ensure automatic protection of safety buses and loads. Multi-plant Action B-23 applied to all operating reactors at that time and plants licensed since were reviewed in accordance with SRP guidance which incorporated this requirement. and it supplemented the requirements in 10 CFR Part 50, General Design Criteria 17 (GDC 17).

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			Institute). If the original statement of staff positions is considered a requirement, then it is contradictory to subsequent NRC guidance. 3. PSB-1 and BTP 8-6 represent guidance as committed to in a licensees' Current Licensing Basis - which, with plant specific justification, may depart from NRC guidelines, but are reviewed and approved by the NRC.	
139	General	STARS	By characterizing the new contents of RIS 2011 - XX as clarifications to "the NRC staff's technical position on existing regulatory requirements," the RIS seeks to supersede the NRC reviewed and approved Current Licensing Basis for many licensees.	Disagree The purpose of the RIS is to clarify the NRC staff's technical position on existing regulatory requirements and voltage studies necessary for Degraded Voltage Relay (second level undervoltage protection) setting bases and Transmission Network/Offsite/Onsite station electric power system design bases. This RIS does not transmit any new requirements or staff positions. A RIS is an appropriate document for NRC staff to provide clarification on existing Regulatory Requirements and existing NRC Staff Positions.
140	General	Greg Reimers (DCCP)	The issue I am concerned about is the regulatory conflict created by requiring the DVR setpoint to preclude spurious actuation of the undervoltage protection function. The NRC draft RIS 2011-XXX discusses spurious separation at least three times. 1. The first occurrence is an accurate restatement of the 1977 NRC position that "The voltage protection shall include coincidence logic to preclude spurious trips of the offsite power source" (See RIS Page 2, Item (b)). 2. The second occurrence is in the "Degraded Voltage Relay Design Calculations" section. Specifically, the second sentence of the first paragraph on Page 7 reads "Voltage-time settings for DVRs should be selected so as to avoid spurious separation of safety buses from the offsite power system during unit startup, normal operation and shutdown." This introduces the DVR voltage and time setpoint interaction with the offsite power circuits as a factor in the setpoint determination. I believe a conclusion of the workshop was a common understanding that the functional requirement of the DVR protection is to prevent common mode equipment failure during a sustained degraded voltage condition. As discussed, this can best be achieved via a "bottom up" analysis without consideration of offsite power capacity and capability. 3. The third occurrence is in the "Offsite/Onsite Design Interface Calculation" Section. Page 8, Item (i) reads "For each case evaluated, the	Agree NRC Staff agrees with commenter's position on use of the term spurious with respect to the design of the DVR scheme to prevent false actuations due to DVR component failures or miss-operations The RIS will be revised to remove spurious from this section. The NRC Staff position is that the settings are to be selected based on the voltage requirements of the 1E equipment such that when compared with the minimum expected grid voltages, there should be sufficient margin ensure that separation from the grid would not be expected during normal, abnormal or accident conditions.

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			calculated voltages on each safety bus should demonstrate adequate voltage at the component level without separation from the offsite circuit due to DVR actuation." Points #2&3 above introduce a contradiction for those stations whose current license basis is consistent with the Standard Technical Specifications. Referring to NUREG-1431, Standard Technical Specifications Westinghouse Plants (typical TS), the degraded voltage TS bases read "The Allowable Value is considered a limiting value such that a [DVR] channel is OPERABLE." Thus, at the Allowable Value lower limit, the Class 1E electrical distribution system is capable of fulfilling its ESF supporting design function. The offsite power LCO reads "Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses." No voltage values are defined for the offsite power TS LCO. Therefore, if the offsite power circuit can maintain the bus voltage such that the DVR lower Allowable Limit is satisfied, then the offsite power circuit would also be operable. The DVR dropout and reset setpoints must be greater than the TS lower Allowable Value due to instrument tolerances and uncertainty. Given the DVR favors the DGs, does not mean bus voltages between the DVR setpoint and the TS lower Allowable Value reduce the *capability* of the offsite power circuit. Consequently, the DVR setpoint cannot completely preclude spurious separation. As discussed in the workshop, a voltage relay cannot predict future operating conditions. Consequently, the DVR can't distinguish between voltage transients that are expected to recover and those that are not. Therefore, in the context of the original NRC position (i.e. Point #1), I believe the term *spurious* was in the context of false signals from within the DVR instrumentation and not any group of bus voltage transients. The IEEE 308 requirement that RIS Page 8, Item (i) is trying to convey is "The preferred power supply shall be capable of starting and operating all required loads."	NRC Staff agrees with commenter's position on use of the term spurious with respect to the design of the DVR scheme to prevent false actuations due to DVR component failures of miss-operations NRC Staff agrees with the commenter's position that the intent of item i) is to specify that the preferred power supply is able to start and run all required 1E equipment in accordance with its voltage requirements while not separating
141	Backup power options	Brian Wilson, CA	Why are there not back-up power sources located on the roof of the fuel cell tanks with electric lines connected directly to the pumps that cool the fuel rods back-up power sources run on both methane or propane and lpg. A remote control panel from a distant site would provide a safe environment to control a dangerous situation safely.	Disagree This comment is not related to the RIS regarding "Adequacy of Station Electric Distribution System Voltage." Therefore, staff did not address the comment.