Progress Energy

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

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63

60-DAY RESPONSE TO NRC GENERIC LETTER 2006-02, "GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

Ladies and Gentlemen:

On February 1, 2006, the Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power," which requested licensees to provide information within 60 days of the date of the GL.

Attachment 1 provides the requested 60-day response to GL 2006-02 for the Harris Nuclear Plant (HNP) of Carolina Power and Light Company (CP&L) doing business as Progress Energy Carolinas, Inc..

This submittal contains no new Regulatory Commitments.

Please refer any question regarding this submittal to Mr. Dave Corlett at (919) 362-3137.

I declare, under penalty of perjury, that the attached information is true and correct. (Executed on APR 03 2006 .)

Sincerely,

CJG/jpy

Attachment:

1. 60-Day Response to Generic Letter (GL) 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power"

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SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
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NRC Question 1 Topic

Use of protocols between the NPP licensee and the TSO, ISO, or RC/RA to assist the NPP licensee in monitoring grid conditions to determine the operability of offsite power systems under plant TS.

NRC Question 1(a)

Do you have a formal agreement or protocol with your TSO?

HNP Response 1(a)

Yes, the Harris Nuclear Plant (HNP) manages interfaces to our Transmission Department and System Planning and Operations Department via a formal Interface Agreement. The parent company of HNP (Carolina Power and Light (CP&L) now doing business as Progress Energy Carolinas, Inc (PEC)) conducts transmission system operations under a vertically integrated utility business model. Under this business model, the transmission system is not in an RTO (Regional Transmission Organization) or operated by an ISO (Independent System Operator) as is the case in other parts of the country. Instead, under our vertically integrated utility business model, the System Operators (Grid Operators) operate both the transmission and generation systems (nuclear and non-nuclear) and work in the same company that holds the licenses to operate the Nuclear Power Plants. Nuclear Power Plant offsite power reliability is jointly managed by the System Operators, Transmission Personnel, and licensed Nuclear Plant Personnel through communications and actions governed and coordinated by the formal Interface Agreement.

NRC Question 1(b)

Describe any grid conditions that would trigger a notification from the TSO to the NPP licensee and if there is a time period required for the notification.

HNP Response 1(b)

With respect to potential grid problems which may be anticipated in advance, PEC's Interface Agreement requires both daily and weekly communications between HNP and TSOs to discuss the status of the plant and the transmission system, review upcoming work activities, and discuss the operating conditions scheduled or anticipated for the current day and the next seven days.

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In addition to normal operational communications, the System Operators initiate communications with HNP for the following infrequent or off-normal situations:

- Tier 1 Transmission Line Out
- Minimum Load Emergency
- System Contingency Alert
- System Reliability Alert
- Energy Emergency Alert (EEA Levels 1 – 3)
- Anticipated Loss of Coolant Accident (LOCA) Voltage Support Problem
- Actual LOCA Voltage Support Problem
- Significant Grid Frequency Problem
- Substation Problem (Plant Impacting Substation Equipment Status Change)
- Severe Weather Conditions
- Sabotage
- Terrorism

No specific time period is applied. However, for anticipated and actual voltage support problems the requirement is to make the notification promptly.

Additional Information: Energy Control Center (ECC) / Plant Communication Terms and Definitions:

SCADA – System Control And Data Acquisition, A system that collects and transmits raw data regarding transmission system parameters

EMS – Energy Management System, A computer system that displays SCADA data and grid controls

State Estimator – A computer program that takes raw data input from SCADA, reconciles inaccuracies, and displays resulting consolidated transmission system parameters

RTCA - Real Time Contingency Analysis, a tool used by the ECC to predict grid conditions such as switchyard voltage at the nuclear plant, assuming postulated system failures such as a nuclear or fossil plant trip or loss of a key transmission line

SORMC - System Operations Reference Manual Carolinas, an ECC operating procedure such as SORMC-GD-22, 23, 24 for Robinson, Harris, and Brunswick Plant Voltage Support & Coordination respectively

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Tier 1 Transmission Line – A transmission line that is directly connected to the plant switchyard

Tier 2 Transmission Line – A transmission line that is not directly connected to the plant switchyard but can affect unit stability when out of service

Minimum Load Emergency – A condition when there is not enough load on the grid to support continued full power operation of the nuclear fleet. The non-nuclear generators have already reduced power as low as they can go without jeopardizing grid reliability

System Contingency Alert – A System Contingency Alert is when a single contingency (possible failure) including reduced import capability could result in all available resources being utilized to meet customer demand and reserve requirements. Plant personnel may choose to curtail activities that increase the risk of tripping a unit or cause any loss of generation. Off-line plants should make preparations to come on-line at a short notice

System Reliability Alert – A System Reliability Alert occurs if a single contingency (possible failure) could result in a generation – load imbalance that may require load curtailments or firm load shedding to correct. This imbalance could be due to insufficient system resources, insufficient off system resources or transmission import limitations. Plant personnel should curtail activities that increase the risk of tripping a unit or may cause any loss of generation. Plants should be notified of an anticipated System Reliability Alert as early as practical

Energy Emergency Alert (EEA Levels 1 – 3) – Established by NERC, defined as follows:

Alert 1 - All Available Resources in Use. Foresee, or experiencing, conditions where all available resources are committed to meet firm load, firm transactions, and reserve commitments, and concerned about sustaining Operating Reserves. Non-firm energy sales have been curtailed.
Alert 2 - Load Management Procedures in Effect. Foresee, or have implemented, procedures up to, but excluding, interruption of firm load commitments.
Alert 3 - Firm Load Interruption Imminent or in Progress. Foresee, or have implemented, firm load obligation interruption. Available energy, as determined from Alert 2, is only accessible with actions taken to increase transmission transfer capabilities.

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Anticipated LOCA Voltage Support Problem – The grid is in a condition where it is anticipated that offsite power voltage support will become insufficient for the plant to remain connected to offsite power during post trip LOCA load sequencing in the near future. Currently, post trip LOCA voltage support from offsite power is still good

Actual LOCA Voltage Support Problem – The grid is in a condition where if the plant were to trip and go into automatic LOCA load sequencing, the plant would not remain connected to offsite power because the degraded grid voltage relays will actuate. Currently, post trip LOCA voltage support from offsite power is not good

Significant Grid Frequency Problem – The grid is experiencing frequency problems to the extent that there may be a concern regarding continued safe operation of the generator and conditions need to be monitored closely

NRC Question 1(c)

Describe any grid conditions that would cause the NPP licensee to contact the TSO. Describe the procedures associated with such a communication. If you do not have procedures, describe how you assess grid conditions that may cause the NPP licensee to contact the TSO.

HNP Response 1(c)

HNP procedures refer to the TSO as the Load Dispatcher. Two different criteria exist in which the main control room (MCR) would contact the TSO, Normal Operation and Abnormal or Emergency Operation.

Under Normal Operating conditions, the TSO would be contacted, as required by procedure, for the following conditions:

- Routine adjustments of Generator MVar loading that require assistance from the TSO
- Power/Load changes
- Operation of the generator voltage adjustor in MANUAL
- Performance of required switching orders
- Surveillance testing of Emergency Diesel Generators (EDGs) that require paralleling with the grid
- Load Limiting LCO

Under Abnormal or Emergency Operating Conditions the TSO would be contacted, as required by procedure, for the following situations:

- Various alarms or conditions that indicate degraded performance of the Main Generator, Main Transformers, Unit Auxiliary Transformers (UAT) or Start-up Transformers (SUT).
- Throughout the performance of the "GRID INSTABILITY" Abnormal Operating Procedure there are numerous communications between the MCR and the TSO in order to keep the plant informed of Grid Stability. Actions taken by the MCR Staff are based on the information received from the TSO.
- Any condition requiring a rapid downpower or Technical Specification required shutdown
- Loss of AC power to both Emergency Buses

NRC Question 1(d)

Describe how NPP operators are trained and tested on the use of the procedures or assessing grid conditions in Question 1(c).

HNP Response 1(d)

Training and testing on assessment of grid conditions during abnormal or upset conditions is provided both in Operator Initial, and Licensed Operator Continuing training (LOCT). Training is provided in the classroom, on a periodic basis, on the applicable Abnormal and Emergency Operating Procedures (AOPs and EOPs, respectively):

Training delivered for the AOP on grid instability, addresses the TSO assessment of grid stability/capability, including the AOP procedural requirement to declare both trains of offsite power inoperable when informed by the TSO that the system cannot provide adequate voltage support in the event of a LOCA.

Simulator training is provided during Operator Initial License training for conditions involving a degraded system grid, with entry into the AOP on grid instability. Simulator exercises are scheduled on a regular periodicity per the LOCT backbone training schedule to exercise the EOP on loss of all AC to the electrical safety buses.

NRC Question 1(e)

If you do not have a formal agreement or protocol with your TSO, describe why you believe you continue to comply with the provisions of GDC 17 as stated above, or describe what actions you intend to take to assure compliance with GDC 17.

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

HNP Response 1(e)

Not applicable. A formal agreement is used as described in the response to Question 1(a).

NRC Question 1(f)

If you have an existing formal interconnection agreement or protocol that ensures adequate communication and coordination between the NPP licensee and the TSO, describe whether this agreement or protocol requires that you be promptly notified when the conditions of the surrounding grid could result in degraded voltage (i.e., below TS nominal trip set-point value requirements; including NPP licensees using allowable value in its TSs) or LOOP (loss of offsite power) after a trip of the reactor unit(s).

HNP Response 1(f)

Formal Interface Agreement requirements are in place and are accomplished by the TSOs who monitor key grid parameters and use predictive analysis tools. The procedures used by the TSOs direct them to promptly notify the Nuclear Plant Operators of conditions for which there would not be adequate switchyard voltage, including predicted post nuclear plant trip conditions. Separate procedural steps are included in these procedures for both conditions which currently exist and conditions which are anticipated to occur. The intent of these separate steps is to provide, as much as possible, early warning to Nuclear Plant Operators of problem conditions as is possible.

NRC Question 1(g)

Describe the low switchyard voltage conditions that would initiate operation of plant degraded voltage protection.

HNP Response 1(g)

During steady state LOCA conditions (after sequencing has completed), if voltage on the HNP 230kv switchyard drops below approx. 216.5kv for at least 13 seconds, the 6.9kv Emergency Bus degraded grid voltage relays will actuate to initiate load shedding, starting the emergency diesels and load sequencing. Under non-LOCA conditions, the time delay would be for at least 54 seconds rather than 13 seconds.

The minimum required switchyard voltage limit provided by the plant to the TSO (222 kV) for operation of the grid is high enough to ensure that the plant remains

connected to offsite power during post trip load sequencing.

The HNP degraded grid voltage relay (DGVR) dropout & pickup (reset) setpoints along with associated time delay setpoints are determined by applicable plant calculations.

The nominal setpoints of the HNP degraded grid voltage relays (on a 6.9kv basis) and associated time delay relays are:

Voltage Dropout	6420 Vac
Voltage Pickup (reset)	6450 Vac
Time Delay (no SIS)	54 seconds
Time Delay (SIS)	13 seconds

NRC Question 2 Topic

Use of criteria and methodologies to assess whether the offsite power system will become inoperable as a result of a trip of your NPP.

NRC Question 2(a)

Does your NPP's TSO use any analysis tools, an online analytical transmission system studies program, or other equivalent predictive methods to determine the grid conditions that would make the NPP offsite power system inoperable during various contingencies? If available to you, please provide a brief description of the analysis tool that is used by the TSO.

HNP Response 2(a)

Yes, the TSO uses procedures based on enveloping Transmission Planning analyses to operate the grid. As long as the grid configuration is within that allowed by the procedure under various system loading conditions, adequate post nuclear plant trip voltage support is assured. Specific case studies are also used from time to time to support planned grid configurations when not clearly bounded by existing analyses. In addition to the transmission system analysis based procedures, the TSOs also use monitoring / predictive analysis computer programs that can predict nuclear plant switchyard voltages expected to occur upon realization of any one of a number of possible losses to the grid, such as a trip of the nuclear plant generator, a trip of another large generator, or the loss of an important transmission line. This monitoring / predictive analysis computer program tool operates based on raw data from transducers across the system which is processed through a state estimator to

generate a current state snapshot of the system. The output is then processed through a contingency analysis program that generates a set of new results with various single elements of the system out of service. These results are then screened against a predetermined set of acceptance limits. Postulated scenarios which then do not meet the acceptance limits are listed for review by the TSO.

NRC Question 2(b)

Does your NPP's TSO use an analysis tool as the basis for notifying the NPP licensee when such a condition is identified? If not, how does the TSO determine if conditions on the grid warrant NPP licensee notification?

HNP Response 2(b)

Yes, notifications are made based on grid configurations being outside of predefined procedure requirements or based on unsatisfactory monitoring / predictive analysis computer program tool results.

NRC Question 2(c)

If your TSO uses an analysis tool, would the analysis tool identify a condition in which a trip of the NPP would result in switchyard voltages (immediate and/or long-term) falling below TS nominal trip setpoint value requirements (including NPP licensees using allowable value in its TS's) and consequent actuation of plant degraded voltage protection? If not, discuss how such a condition would be identified on the grid.

HNP Response 2(c)

Yes, procedures and monitoring / predictive analysis tools are in place for this purpose.

NRC Question 2(d)

If your TSO uses an analysis tool, how frequently does the analysis tool program update?

HNP Response 2(d)

The predictive analysis computer program updates every 10 minutes. Also, the grid operating procedures that are based on enveloping transmission system analyses are updated when transmission system or plant changes require it.

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"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

NRC Question 2(e)

Provide details of analysis tool-identified contingency conditions that would trigger an NPP licensee notification from the TSO.

HNP Response 2(e)

Analysis tool-identified contingency conditions would include, an actual or anticipated grid configuration outside the bounds of the enveloping transmission system analysis based procedure requirements. In addition, monitoring / predictive analysis computer program validated results that do not meet the predetermined acceptance limit for minimum required switchyard voltage. The analyzed contingencies that are evaluated against the HNP voltage requirements include: loss of another generator, loss of a significant transmission line, loss of a capacitor bank, or loss of the plant, itself. If the plant voltage requirement cannot be met under any of the contingencies considered the plant Control Room Operators will be notified. The same minimum required switchyard voltage limit bases that are used in the grid operating procedures are also used in the predictive analysis computer programs.

NRC Question 2(f)

If an Interface Agreement exists between the TSO and the NPP licensee, does it require that the NPP licensee be notified of periods when the TSO is unable to determine if offsite power voltage and capacity could be inadequate? If so, how does the NPP licensee determine that the offsite power would remain operable when such a notification is received?

HNP Response 2(f)

Yes, if analysis tools are out of service to such an extent that system conditions are indeterminate, then implementing procedures used by the System Operators require notification to be made because a condition would exist where adequate voltage support capability for NPP support is outside the guidelines of the current analysis. Upon such notification, the NPP licensee will make an offsite power operability determination under the plant Technical Specifications. In addition, the System Operator will continue efforts to determine by alternate method(s) (e.g. offline study) if NPP voltage requirements are satisfied or not.

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

NRC Question 2(g)

After an unscheduled inadvertent trip of the NPP, are the resultant switchyard voltages verified by procedure to be bounded by the voltages predicted by the analysis tool?

HNP Response 2(g)

No, not by procedure. However, such analyses have been performed on a case by case basis to validate predicted results.

NRC Question 2(h)

If an analysis tool is not available to the NPP licensee's TSO, do you know if there are any plans for the TSO to obtain one? If so, when?

HNP Response 2(h)

Not applicable, an analysis tool is available.

NRC Question 2(i)

If an analysis tool is not available, does your TSO perform periodic studies to verify that adequate offsite power capability, including adequate NPP post-trip switchyard voltages (immediate and/or long-term), will be available to the NPP licensee over the projected timeframe of the study?

HNP Response 2(i)

An analysis tool is available. Additionally, the results of enveloping Transmission Planning analyses incorporated into grid operating procedures are also used.

NRC Question 2(i)(a)

Are the key assumptions and parameters of these periodic studies translated into TSO guidance to ensure that the transmission system is operated within the bounds of the analyses?

HNP Response 2(i)(a)

Yes, grid operating procedures ensure that the configuration of the system is bounded by the analyses.

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

NRC Question 2(i)(b)

Are the key assumptions and parameters of these periodic studies translated into TSO guidance to ensure that the transmission system is operated within the bounds of the analyses? If the bounds of the analyses are exceeded, does this condition trigger the notification provisions discussed in Question 1 above?

HNP Response 2(i)(b)

Yes, notification is required if the configuration of the grid is not within the bounds of the procedures.

NRC Question 2(j)

If your TSO does not use, or you do not have access to the results of an analysis tool, or your TSO does not perform and make available to you periodic studies that determine the adequacy of offsite power capability, please describe why you believe you comply with the provisions of GDC 17 as stated above, or describe what compensatory actions you intend to take to ensure that the offsite power system will be sufficiently reliable and remain operable with high probability following a trip of your NPP.

HNP Response 2(j)

Not applicable, a predictive analysis tool and enveloping transmission system analyses are used.

NRC Question 3 Topic

Use of criteria and methodologies to assess whether the NPP's offsite power system and safety-related components will remain operable when switchyard voltages are inadequate.

NRC Question 3(a)

If the TSO notifies the NPP operator that a trip of the NPP, or the loss of the most critical transmission line or the largest supply to the grid would result in switchyard voltages (immediate and/or long-term) below TS nominal trip setpoint value requirements (including NPP licensees using allowable value in its TSs) and would actuate plant degraded voltage protection, is the NPP offsite power system declared inoperable under the plant TSs? If not, why not?

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

HNP Response 3(a)

In accordance with AOP on grid instability, if the TSO informs the MCR that "The system grid is unable to provide adequate voltage support in the event of a LOCA," then both trains of offsite power are declared inoperable per the applicable plant TS. Non-Harris Plant trip contingencies which have not actually occurred, such as the postulated loss of an important transmission line or other large generator, do not make offsite power inoperable. Should such an event actually occur, making voltage support inadequate, notification from the TSO will be made and offsite power would then be declared inoperable.

NRC Question 3(b)

If onsite safety-related equipment (e.g., emergency diesel generators or safety-related motors) is lost when subjected to a double sequencing (LOCA with delayed LOOP event) as a result of the anticipated system performance and is incapable of performing its safety functions as a result of responding to an emergency actuation signal during this condition, is the equipment considered inoperable? If not, why not?

HNP Response 3(b)

The design of the HNP emergency safeguards sequencer is such that loss of safety-related equipment during a "double-sequencing" event (LOCA with delayed LOOP) would not be expected. Per the applicable plant system description, the emergency sequencer system sequentially starts emergency equipment during LOCA, LOOP or LOCA/LOOP conditions. There are separate sequencer "programs" for each of these events. The LOOP signal is generated by the 6.9kv Emergency Bus 86UV (undervoltage lockout) relays and the LOCA signal is generated by either the K-609 or K-635 safety injection actuation signal relay.

A LOOP signal trips the affected 6.9kv emergency bus main breaker and its feeder breakers with the exception of the feeder breaker feeding Power Center 1A2-SA and 1B2-SB. Even though the breakers feeding these power centers do not trip, individual loads fed from Power Centers 1A2-SA and 1B2-SB are tripped by the power centers' own undervoltage relays. Simultaneously, start signals are sent to the EDGs and Emergency Safeguards Sequencers. Within 10 seconds, voltage is restored (via the EDGs) to the affected 6.9kv emergency buses and sub-fed Power Centers 1A2-SA and 1B2-SB. Then, ½ seconds after voltage restoration, the breakers supplying Power Centers 1A3-SA and 1B3-SB close re-energizing the

safety-related MCCs. Loads required for a loss-of-offsite-power condition are then sequenced on.

A LOCA signal starts the EDGs, but they do not connect to the 6.9kv emergency buses if off-site power is available. The only 6.9kv emergency bus breakers which trip on a LOCA signal (with off-site power available) are the breakers supplying non-safety related Power Centers 1A1 and 1B1. Sequenced loading commences immediately since there is no time delay for the EDG to come up to speed and voltage.

A LOCA/LOOP signal results in load shedding as discussed previously for a LOOP. Similar to a LOOP, after approximately 10 seconds, the EDGs connect to their respective 6.9kv emergency buses and re-power Power Centers 1A2-SA and 1B2-SB. After ½ second, power is restored to Power Centers 1A3-SA and 1B3-SB after which the remaining essential loads are sequenced on.

Essential loads are divided into eight "load blocks". There are five second delays between load blocks except for the delays between Load Blocks (LBs) 6 & 7 and between LBs 7 & 8 which are 10 seconds duration. During sequencer operation, loads are prevented from starting on an automatic process demand signal such as temperature or pressure. After the sequencer has run through the eight load blocks for starting essential loads, a permissive signal (known as LB 9) is generated which allows Operators to energize non-essential loads fed from the emergency power system, i.e. from Power Centers 1A1 & 1B1. The 6.9kv emergency bus undervoltage and degraded grid voltage relays are enabled during LOCA sequencing with off-site power available. During a LOOP or LOCA/LOOP where the EDGs are supplying the emergency power systems, the load shedding function of these relays is disabled.

In the scenario described in Question 3.b, a LOCA occurs first. No 6.9 kV load shedding will occur other than tripping of one non-safety related power center powered from each 6.9kv emergency bus. If not already running, safety-related loads would be sequenced on to start at the proper time in accordance with the emergency load sequencer LOCA program. If a LOOP were then to occur during load sequencing, the bus undervoltage relay logic would trip the 6.9kv emergency bus main breaker and feeder breakers as discussed above. The emergency diesel generators would already be running since the LOCA signal would start them. After the EDG breakers close to re-energize the 6.9kv emergency buses, the load sequencer would re-start after a 10 second delay and loads would be sequenced on in accordance with the LOCA/LOOP program of the sequencer. If a LOOP occurred first, followed by a LOCA signal during sequencing, the sequencer LOOP program would terminate and previously started loads not associated with the LOCA program

would trip (LOCA loads would remain running). No further load starting would occur until the LOCA program "catches up" to the point where the LOOP program terminated.

In addition to the design of the Sequencer Programs as described above, the HNP Emergency Operating Procedures address the possibility of a LOOP following a LOCA after the Safety Injection Signal has been RESET. If this occurs, the restart of the required equipment to support the mitigation of the LOCA is procedurally directed.

NRC Question 3(c)

Describe your evaluation of onsite safety-related equipment to determine whether it will operate as designed during the condition described in question 3(b).

HNP Response 3(c)

Minimum steady-state, minimum transient and maximum steady state voltage criteria are established for each safety-related power supply in Calculation E-6003. Voltage criteria for each power supply is established by determining the voltage requirements of individual safety-related equipment (continuous loads, Motor Operated Valves (MOVs), control circuits, etc.) fed from each power supply and then "transposing" the voltage requirements of individual equipment up to the power supply considering cable voltage drop. Voltage criteria for the safety-related power supplies is then used in the voltage study as described below.

The HNP voltage study calculates and evaluates power system voltages, loading and available fault current under various plant operating conditions (e.g. normal full power, LOCA). Ensuring that safety-related power supplies operate within the minimum and maximum voltage criteria provides a high level of assurance that safety-related equipment powered from these power supplies will not incur damage which could prevent them from functioning when required to do so under normal and accident conditions. In addition to evaluating emergency power system voltage adequacy by analysis, the settings of the emergency power system degraded grid voltage relays will ensure that abnormal power system voltage "sags" will not damage safety-related equipment. The settings of the degraded grid voltage relays ensure that safety-related equipment will not be subjected to sustained voltages below that recommended by the manufacturer for longer than 54 seconds (13 seconds if an SI signal is present). The DGVR settings also ensure that control circuits will function properly, control circuit fuses will not blow and MOV actuator torque will be sufficient. Loss of Offsite Power (LOOP) undervoltage relays will separate the emergency power systems from the preferred source (offsite) with

minimal time delay (1 second nominal) upon 6.9kv emergency bus voltage dropping below 4830vac (nominal) which is approximately 73% of motor nameplate voltage.

NRC Question 3(d)

If the NPP licensee is notified by the TSO of other grid conditions that may impair the capability or availability of offsite power, are any plant TS action statements entered? If so, please identify them.

HNP Response 3(d)

If at anytime a question exists as to the capability of offsite power to support HNP in the event of a LOCA, the AOP for grid instability provides the applicable guidance for operability. No other conditions associated with grid voltage would require declaring any safety-related equipment inoperable.

NRC Question 3(e)

If you believe your plant TSs do not require you to declare your offsite power system or safety-related equipment inoperable in any of these circumstances, explain why you believe you comply with the provisions of GDC 17 and your plant TSs, or describe what compensatory actions you intend to take to ensure that the offsite power system and safety-related components will remain operable when switchyard voltages are inadequate.

HNP Response 3(e)

Not applicable. As previously stated in the HNP response to Question 3(d), if switchyard voltages were inadequate, then both trains of offsite power would be declared inoperable.

NRC Question 3(f)

Describe if and how NPP operators are trained and tested on the compensatory actions mentioned in your answers to questions 3(a) through (e).

HNP Response 3(f)

Operator training associated with emergency bus undervoltage setpoints and actuation logic is provided to all initial license candidates during basic systems training. The expectation that licensed operators know safeguards actuation signals/setpoints/coincidences is clearly communicated and regularly tested during

continuing training. Operator training relative to the AOP on grid instability is provided during licensed operator initial training, and periodically during licensed operator continuing training. The procedural direction to declare both trains of offsite power inoperable if the TSO informs the MCR that required post-LOCA voltage support will not be met is addressed during that training. In the event of a LOOP subsequent to LOCA (reference Question 3(b) above), the applicable EOPs are written to direct the operator to manually realign safeguards equipment following a LOOP at the point that the emergency safeguards sequencer LOCA program is reset. This failure is exercised during LOCT simulator training on a periodic basis.

NRC Question 4 Topic

Use of criteria and methodologies to assess whether the offsite power system will remain operable following a trip of your NPP.

NRC Question 4(a)

Do the NPP operators have any guidance or procedures in plant TS bases sections, the final safety analysis report, or plant procedures regarding situations in which the condition of plant-controlled or -monitored equipment (e.g., voltage regulators, auto tap changing transformers, capacitors, static VAR compensators, main generator voltage regulators) can adversely affect the operability of the NPP offsite power system? If so, describe how the operators are trained and tested on the guidance and procedures.

HNP Response 4(a)

Yes. The applicable plant TS Bases states, "The minimum alignment of offsite power sources will be maintained such that two physically independent offsite circuits are available. The two physically independent circuits may consist of any two of the incoming transmission lines to the SATs (either through the switchyard or directly) and into the Class 1E system. As long as there are at least two transmission lines in service and two circuits through the SATs to the Class 1E buses, the LCO is met."

Operability of the offsite power system at HNP does not rely on plant-controlled equipment such as static VAR compensators, capacitors, or auto-tap changing transformers. The offsite power system is dependent on transmission system voltage support post-trip. HNP procedural guidance on operability of the offsite power source is centered on the number of operable independent transmission lines supplying the plant's 230kV switchyard, and on the operability of safety-related plant

equipment associated with the offsite power supply (circuit breakers, Startup Auxiliary Transformers, and the ties to the onsite electrical distribution system). Procedural guidance is provided regarding target voltage schedule and operation of the main generator voltage regulator. Operation of the main generator within the plant voltage schedule ensures that a trip of the generator does not result in an unacceptable voltage drop in the switchyard.

The TSO procedure for HNP voltage support and coordination defines the TSOs' actions and requirements during high load conditions relative to HNP voltage support. These actions are based on transmission system enveloping analyses wherein worst-case loss of any generating station (including HNP) on the Progress Energy system is considered relative to HNP post-LOCA voltage support. In the event system conditions are outside the guidelines of the analysis based procedure, the TSO will alert HNP to that effect.

Considerations regarding reliability of the offsite power supply (ability of the system to supply adequate post-LOCA voltage) are factored into abnormal operating procedures. If, at any time, the TSO determines the system is incapable of providing adequate support in the event of a LOCA, the HNP MCR is notified, and operators are procedurally directed to declare both offsite power sources inoperable.

NRC Question 4(b)

If your TS bases sections, the final safety analysis report, and plant procedures do not provide guidance regarding situations in which the condition of plant-controlled or monitored equipment can adversely affect the operability of the NPP offsite power system, explain why you believe you comply with the provisions of GDC 17 and the plant TSs, or describe what actions you intend to take to provide such guidance or procedures.

HNP Response 4(b)

Not applicable, suitable guidance is provided.

NRC Question 5 Topic

Performance of grid reliability evaluations as part of the maintenance risk assessments required by 10 CFR 50.65(a)(4).

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

NRC Question 5(a)

Is a quantitative or qualitative grid reliability evaluation performed at your NPP as part of the maintenance risk assessment required by 10 CFR 50.65(a)(4) before performing grid-risk-sensitive maintenance activities? This includes surveillances, post-maintenance testing, and preventive and corrective maintenance that could increase the probability of a plant trip or LOOP or impact LOOP or SBO coping capability, for example, before taking a risk-significant piece of equipment (such as an EDG, a battery, a steam-driven pump, an alternate AC power source) out-of-service?

HNP Response 5(a)

Yes. The HNP plant procedure for online maintenance risk management directs a review of all tasks performed at HNP. HNP utilizes a blended approach, both quantitative (through the use of Equipment Out of Service Software (EOOS)) and/or qualitative analyses are utilized to evaluate the risk associated with a task. The procedure for online EOOS models for risk assessment provides specific guidelines for inputting increased risk factors related to activities in the plant switchyard as well as inclement weather. An attachment also provides specific guidelines for inputting increased risk factors related to activities that may increase the possibility of a reactor or turbine trip. Thus, any activity related to work on an EDG, a station battery, a steam driven pump, or alternate AC power source is evaluated using the blended approach prior to allowing the activity to occur. Any emergent condition that occurs during such activities is also evaluated per the applicable HNP plant procedure utilizing this same blended approach by the plant staff.

NRC Question 5(b)

Is grid status monitored by some means for the duration of the grid-risk-sensitive maintenance to confirm the continued validity of the risk assessment and is risk reassessed when warranted? If not, how is the risk assessed during grid-risk-sensitive maintenance?

HNP Response 5(b)

Yes. HNP has established an Interface Agreement, which specifies the responsibilities, and lines of communication for the various organizations responsible for the operation, maintenance, and engineering of transmission facilities associated with our nuclear plants, as well as the consideration of the impact their activities may have on those plants transmission facilities. This directive clearly defines the

requirements for communication of planned activities, and changes in plant SSC status which may affect grid stability/reliability. The TSO is required to monitor system conditions to ensure adequate voltage is maintained to support each nuclear plant in the event of an accident, and promptly notify the NPP operator of existing, or anticipated conditions which would result in inadequate voltage support. The risk management procedures require that plant risk be reassessed based emergent failure or degradation of plant SSC's.

NRC Question 5(c)

Is there a significant variation in the stress on the grid in the vicinity of your NPP site caused by seasonal loads or maintenance activities associated with critical transmission elements? Is there a seasonal variation (or the potential for a seasonal variation) in the LOOP frequency in the local transmission region? If the answer to either question is yes, discuss the time of year when the variations occur and their magnitude.

HNP Response 5(c)

Yes, the summer peak loads (July & August) as well as Spring and Fall maintenance outage activities result in variation in the stress on the capability of the grid to supply power. These variations are predictable, planned for, and managed. The magnitude of the variations results in less margin in the system to provide adequate voltage support. For this reason, we use additional analytical studies to ensure adequate voltage support is maintained during these periods. HNP has not had any LOOP events, so no seasonal variation regarding LOOP events is indicated below.

Seasonal Variation Loop Events				
Plant	Spring Mar.-May	Summer June-Aug.	Fall Sept.-Nov.	Winter Dec.-Feb.
HNP	0	0	0	0

NRC Question 5(d)

Are known time-related variations in the probability of a LOOP at your plant site considered in the grid-risk-sensitive maintenance evaluation? If not, what is your basis for not considering them?

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

HNP Response 5(d)

No, not based on the time of year. Variations in the probability of a LOOP are addressed based on notification protocols with the TSO and local weather predictions regardless of the time of year. HNP typically experiences higher levels of grid loading during some portions of the summer or winter months resulting in a higher potential for a loss of offsite power. The TSO evaluates grid load stress and notifies HNP of upcoming grid stress potential through declaration of system contingency alerts and system reliability alerts. Applicable HNP plant procedures contain required HNP actions to curtail or reschedule HNP activities during times of increased grid stress based this notification to manage the risk. These alert levels are generally predictable in advance and are thus considered in weekly maintenance planning.

NRC Question 5(e)

Do you have contacts with the TSO to determine current and anticipated grid conditions as part of the grid reliability evaluation performed before conducting grid-risk-sensitive maintenance activities?

HNP Response 5(e)

Yes, the plant MCR staff performs continuous monitoring of HNP onsite power systems and the TSO provides continuous monitoring of grid conditions. The Interface Agreement requires:

> *System Operations shall contact Nuclear Plant Operations-Control Room each day to discuss the status of the plant and the transmission system and review upcoming work activities.*
>
> *System Operations shall contact Nuclear Plant Operations-Control Room each week to discuss the operating conditions scheduled or anticipated for the next seven days. (Note: Revision 5 of the Interface Agreement changes this step so that NPP O&S contacts System Operations each week. This change becomes effective on 3/30/2006).*
>
> *System Operations shall provide direction to Nuclear Plant Operations-Control Room regarding generating unit operating parameters for voltage schedule, desired switchyard bus voltage, minimum and maximum MVAR output, and MW output. Nuclear Plant Operations-Control Room shall keep System Operations informed as to plant conditions which may create difficulties in meeting these parameters.*

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

Applicable procedures also define the roles and responsibilities of the HNP Plant Transmission Activities Coordinator (PTAC). The PTAC is responsible for the communication of upcoming grid conditions and work activities and communicates these items to the Outage & Scheduling Group Work Week Managers and the MCR staff as required.

HNP procedures require notification to the TSO prior to connecting the EDG to the grid and prior to removing the EDG from the grid.

NRC Question 5(f)

Describe any formal agreement or protocol that you have with your TSO to assure that you are promptly alerted to a worsening grid condition that may emerge during a maintenance activity.

HNP Response 5(f)

Interface Agreements are in place to establish the interfaces between the TSO and the Nuclear Plant Operators. The agreement, along with the operating procedures used by the TSOs, ensure that early notification of worsening grid conditions take place. This notification occurs whether or not a specific maintenance activity is in progress at the plant.

With respect to potential grid problems which may be anticipated in advance, the agreement requires both daily and weekly communications between HNP and the TSO to discuss the status of the plant and the transmission system, review upcoming work activities, and discuss the operating conditions scheduled or anticipated for the next day and the next seven days. This communication provides a means for the grid and plant operators to know what is going on with each others systems.

With respect to potential grid problems which may occur with little or no advanced warning, the TSO is in a unique position to anticipate and assess grid problems via information obtained from: the grid Supervisory Control and Data Acquisition System (SCADA System), communications with field personnel, communications with neighboring utilities, and timely reports from various weather services. Implementing procedures require that System Operations monitor system conditions and promptly notify Control Room Operations of any existing or anticipated conditions which would result in inadequate voltage support.

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

NRC Question 5(g)

Do you contact your TSO periodically for the duration of the grid-risk-sensitive maintenance activities?

HNP Response 5(g)

Yes. HNP has established an Interface Agreement which specifies the responsibilities, and lines of communication for the various organizations responsible for the operation, maintenance, and engineering of transmission facilities associated with HNP, as well as, the consideration of the impact their activities may have on the plant's transmission facilities. This directive clearly defines the requirements for communication of planned activities, and changes in plant SSC status which may affect grid stability/reliability. Requirements are given for the TSO to contact the NPP operator each day to discuss plant status, and conduct a review of upcoming work activities, as well as, communication each week to discuss operating conditions scheduled or anticipated for the next seven days. The TSO is also required to monitor system conditions to ensure adequate voltage is maintained to support each nuclear plant in the event of an accident, and promptly notify the NPP operator of existing, or anticipated conditions which would result in inadequate voltage support. The NPP operator is directed to notify the TSO of any plant activity that may impact generation capability.

NRC Question 5(h)

If you have a formal agreement or protocol with your TSO, describe how NPP operators and maintenance personnel are trained and tested on this formal agreement or protocol.

HNP Response 5(h)

Plant operators are trained on the transmission Interface Agreement on an eighteen-month periodicity. This training is provided in the form of a required reading package to operations personnel. Training is controlled by a regularly scheduled pre-outage task to be delivered prior to each refueling outage. Training for the maintenance contact (PTAC) is performed on an annual basis, and is governed by the Interface Agreement itself.

Transmission Maintenance personnel are responsible for maintenance on transmission lines, switchyard equipment (i.e., breakers and relaying), and

transformers that supply off-site power into the plant. These personnel receive initial and annual refresher training in accordance with Section 11.2 of NGGM-IA-0003.

NRC Question 5(i)

If your grid reliability evaluation, performed as part of the maintenance risk assessment required by 10 CFR 50.65(a)(4), does not consider or rely on some arrangement for communication with the TSO, explain why you believe you comply with 10 CFR 50.65(a)(4).

HNP Response 5(i)

Not Applicable. Arrangements are in place for communication with the TSO.

NRC Question 5(j)

If risk is not assessed (when warranted) based on continuing communication with the TSO throughout the duration of grid-risk-sensitive maintenance activities, explain why you believe you have effectively implemented the relevant provisions of the endorsed industry guidance associated with the maintenance rule.

HNP Response 5(j)

Not applicable. Risk is assessed when warranted. HNP has procedures in place to effectively implement appropriate communication as required in response to any increase in risk throughout the duration of grid risk-sensitive activities per applicable plant procedure requirements.

NRC Question 5(k)

With respect to questions 5(i) and 5(j), you may, as an alternative, describe what actions you intend to take to ensure that the increase in risk that may result from proposed grid-risk-sensitive activities is assessed before and during grid-risk-sensitive maintenance activities, respectively.

HNP Response 5(k)

Not applicable. HNP does not intend to take any alternative actions at this time.

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

NRC Question 6 Topic

Use of risk assessment results, including the results of grid reliability evaluations, in managing maintenance risk, as required by 10 CFR 50.65(a)(4).

NRC Question 6(a)

Does the TSO coordinate transmission system maintenance activities that can have an impact on the NPP operation with the NPP operator?

HNP Response 6(a)

Yes, the TSO coordinates transmission system maintenance activities that can have an impact on plant operation with the NPP operator and plant transmission activities coordinator (PTAC). The Interface Agreement defines and controls the Interfaces for Operations, Maintenance, and Engineering Activities at Nuclear Plants. The PTAC serves as the single point of contact for transmission engineering, construction, and maintenance activities impacting the nuclear plant. In addition, the TSO communicates directly with the NPP operators regarding operational interfaces as described in our Interface Agreement.

NRC Question 6(b)

Do you coordinate NPP maintenance activities that can have an impact on the transmission system with the TSO?

HNP Response 6(b)

Yes, coordination of testing and maintenance activities at HNP that could affect electrical supply diversity is performed by the HNP Outage and Scheduling organization and the PTAC in accordance with the Interface Agreement. These activities are integrated into the online and outage scheduling processes per applicable site procedures. Online maintenance risk evaluations are performed for each work week as schedule changes occur. Safe shutdown risk assessments are also performed to evaluate each outage schedule prior to the outage. These reviews include representatives from the applicable Transmission Area Maintenance staff. This provides direct attention to transmission outage activities and aids in assessing their effects on defense in depth for electrical power supply.

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

NRC Question 6(c)

Do you consider and implement, if warranted, the rescheduling of grid-risk-sensitive maintenance activities (activities that could (i) increase the likelihood of a plant trip, (ii) increase LOOP probability, or (iii) reduce LOOP or SBO coping capability) under existing, imminent, or worsening degraded grid reliability conditions?

HNP Response 6(c)

Yes, the TSO communicates daily with the Operations staff to discuss system conditions. Additionally, the TSO notifies Operations if any preset conditions are met which would indicate challenges to grid reliability. The TSO advises of potential challenges to grid stability/reliability. EDG and switchyard maintenance activities are not scheduled concurrently. Grid conditions are evaluated prior to authorizing work on an EDG or in the switchyard. The Interface Agreement discusses the "day to day operations" responsibilities and communications between Transmission System Operations (TSO) and the Nuclear Plant Operations-Control Room. It also describes our process for deferring previously scheduled work when needed.

NRC Question 6(d)

If there is an overriding need to perform grid-risk-sensitive maintenance activities under existing or imminent conditions of degraded grid reliability, or continue grid-risk-sensitive maintenance when grid conditions worsen, do you implement appropriate risk management actions? If so, describe the actions that you would take. (These actions could include alternate equipment protection and compensatory measures to limit or minimize risk.)

HNP Response 6(d)

Yes, if there is an overriding need to perform grid-risk-sensitive maintenance activities under existing or imminent conditions of degraded grid reliability, or continue grid-risk-sensitive maintenance when grid conditions worsen, then the online maintenance risk management procedure directs a review of all cumulative effects. The resulting risk impact from the blended approach, both quantitative (through the use of EOOS software) and/or qualitative analysis will result in consideration of additional risk management actions. The result may be an increase to an elevated risk status and implementation of HNP plant procedures for online risk management commensurate with the risk such as:

- Plant General Manager approval
- Provide increased risk awareness and control:
    - Discuss planned maintenance activity with the operating shift

  - Conduct pr-job briefings, emphasizing risk aspects of the planned evolution
  - Request engineering present for the activity
- Perform actions to reduce duration of the activity:
  - Pre stage parts and materials
  - Walk-down clearance and/or work scope
  - Conduct training or mockups
  - Work activity round the clock
  - Establish contingency plans for rapid restoration of equipment
- Perform actions to minimize the magnitude of the risk increase:
  - Minimize other work in areas that could affect initiators to decrease the frequency of initiating events that are mitigated by the safety function served by the out of service SSC
  - Minimize other work in areas that could affect other redundant systems such that there is enhanced likelihood of the availability of the safety functions at issue served by the SSCs in those areas.
  - Establish alternate success paths for the performance of the safety function of the out of service SSC.
- Perform actions to protect opposite train or redundant equipment

NRC Question 6(e)

Describe the actions associated with questions 6(a) through 6(d) above that would be taken, state whether each action is governed by documented procedures and identify the procedures, and explain why these actions are effective and will be consistently accomplished.

HNP Response 6(e)

These actions are required Maintenance Rule processes that are implemented by procedure. Thus, the effectiveness and consistency is continually assessed and monitored. The Interface Agreement is the primary document which establishes the interfaces between the TSOs and the Nuclear Plant Operators. This agreement, along with the operating procedures used by the TSOs, ensures compliance. This agreement is binding in that it has been approved at the company Department level and periodic assessments are conducted to ensure compliance. In regards to identifying off-site power requirements, the importance of meeting these requirements, and recognizing that nuclear plants have high priority when restoring power, all of these attributes are included in the agreement and implemented as described.

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE
OPERABILITY OF OFFSITE POWER"

NRC Question 6(f)

Describe how NPP operators and maintenance personnel are trained and tested to assure they can accomplish the actions described in your answers to question 6(e).

HNP Response 6(f)

The PTAC has a common training guide that provides the knowledge and skills necessary to independently perform the required tasks The HNP PTAC is qualified.

Plant operators are trained in the use of the on-line risk management tool EOOS, for evaluation of emergent risk. This task is generally assigned to the Shift Technical Advisor (STA), and is specifically included during STA initial qualification and is evaluated periodically on the simulator. Evaluation of online risk is also considered in the SSO (Shift Manager) initial qualification process. Given the amount of switchyard and bus maintenance performed during refueling outages, training related to risk management associated with transmission maintenance is delivered pre-outage. Operations required reading associated with the Transmission System Interface Agreement is distributed on an 18-month periodicity as part of pre-outage preparations. A regular feature of pre-outage Operations continuing training is review of guidance for shutdown risk mitigation as part of training delivered by the Outage & Scheduling unit on refueling outage risk.

Transmission Maintenance personnel are responsible for maintenance on transmission lines, switchyard equipment (i.e., breakers and relaying), and transformers that supply off-site power into the plant. These personnel receive initial and annual refresher training in accordance with the Interface Agreement.

NRC Question 6(g)

If there is no effective coordination between the NPP operator and the TSO regarding transmission system maintenance or NPP maintenance activities, please explain why you believe you comply with the provisions of 10 CFR 50.65(a)(4).

HNP Response 6(g)

Not Applicable. Effective coordination between the NPP operator and the TSO regarding transmission system maintenance or NPP maintenance activities is in accordance with the Interface Agreement.

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER"

NRC Question 6(h)

If you do not consider and effectively implement appropriate risk management actions during the conditions described above, explain why you believe you effectively addressed the relevant provisions of the associated NRC-endorsed industry guidance.

HNP Response 6(h)

Not applicable. HNP does effectively implement appropriate risk management actions per applicable procedures and the ``.

NRC Question 6(i)

You may, as an alternative to questions 6(g) and 6(h) describe what actions you intend to take to ensure that the increase in risk that may result from grid-risk-sensitive maintenance activities is managed in accordance with 10 CFR 50.65(a)(4).

HNP Response 6(i)

Not applicable. HNP does not intend to take any alternative actions.

NRC Question 7 Topic

Procedures for identifying local power sources that could be made available to resupply your plant following a LOOP event.

NRC Question 7(a)

Briefly describe any agreement made with the TSO to identify local power sources that could be made available to resupply power to your plant following a LOOP event.

HNP Response 7(a)

An agreement is in place to restore power to HNP as soon as possible. In addition, a system operations procedure provides detailed instructions for prompt plant offsite power restoration. The procedure specifies various means of accomplishing the required power restoration. TSOs train on this procedure annually per NERC training requirements.

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE
OPERABILITY OF OFFSITE POWER"

NRC Question 7(b)

Are your NPP operators trained and tested on identifying and using local power sources to resupply your plant following a LOOP event? If so, describe how.

HNP Response 7(b)

Yes. While the grid operator is restoring off-site power using offsite power sources following a LOOP event, the immediate concern of the plant operator is to ensure power to the Emergency Buses from the on-site Emergency Diesel Generators (EDGs).

Licensed operators are trained on restoration of offsite power following a LOOP or station blackout and on establishing backfeed via the Main Transformers. Non-licensed operators are trained on local manual start of an Emergency Diesel Generator following loss of all AC power, with accompanying job performance measures. Procedural and other written guidance exists for local manual start of EDGs with and without DC power available, and guidance exists for aligning alternate AC power sources (gas powered generators) to DC battery chargers. Incident Stabilization Guidelines are not trained on. No other training related to use of local power sources to resupply the plant following a LOOP event is provided.

NRC Question 7(c)

If you have not established an agreement with your plant's TSO to identify local power sources that could be made available to resupply power to your plant following a LOOP event, explain why you believe you comply with the provisions of 10 CFR 50.63, or describe what actions you intend to take to establish compliance.

HNP Response 7(c)

Not applicable, the necessary agreement and implementing procedure are in place.

NRC Question 8 Topic

Maintaining SBO coping capabilities in accordance with 10 CFR 50.63.

NRC Question 8(a)

Has your NPP experienced a total LOOP caused by grid failure since the plant's coping duration was initially determined under 10 CFR 50.63?

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE
OPERABILITY OF OFFSITE POWER"

HNP Response 8(a)

No, HNP has not experienced a total LOOP event since the plant's coping duration was initially determined under 10 CFR 50.63 as confirmed by a review of the HNP docketed correspondence (LERs). See previous response to TI2515/156. Based on this, HNP does not meet the criteria for re-evaluating the Station Blackout coping duration.

NRC Question 8(b)

If so, have you reevaluated the NPP using the guidance in Table 4 of RG 1.155 to determine if your NPP should be assigned to the P3 offsite power design characteristic group?

HNP Response 8(b)

Not applicable. See response to Question 8(a).

NRC Question 8(c)

If so, what were the results of this reevaluation, and did the initially determined coping duration for the NPP need to be adjusted?

HNP Response 8(c)

Not applicable. See response to Question 8(a).

NRC Question 8(d)

If your NPP has experienced a total LOOP caused by grid failure since the plant's coping duration was initially determined under 10 CFR 50.63 and has not been reevaluated using the guidance in Table 4 of RG 1.155, explain why you believe you comply with the provisions of 10 CFR 50.63 as stated above, or describe what actions you intend to take to ensure that the NPP maintains its SBO coping capabilities in accordance with 10 CFR 50.63.

HNP Response 8(d)

Not applicable. See response to Question 8(a).

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
60-DAY RESPONSE TO GENERIC LETTER (GL) 2006-02,
"GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE
OPERABILITY OF OFFSITE POWER"

NRC Question 9

If you determine that any action is warranted to bring your NPP into compliance with NRC regulatory requirements, including TSs, GDC 17, 10 CFR 50.65(a)(4), 10 CFR 50.63, 10 CFR 55.59 or 10 CFR 50.120, describe the schedule for implementing it.

HNP Response 9

Not Applicable. Based on the responses above, HNP is in compliance with NRC regulatory requirements.