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Vice President

April 3, 2006

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Subject: **Docket Nos. 50-361, 50-362**
**Response to Generic Letter 2006-02,**
**"Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power"**
**San Onofre Nuclear Generating Station, Units 2 and 3**

Dear Sir or Madam:

Enclosed is Southern California Edison's (SCE) response to Generic Letter (GL) 2006-02. GL 2006-02 requested information in four areas:

(1) use of protocols between the nuclear power plant (NPP) and the transmission system operator (TSO), independent system operator (ISO), or reliability coordinator/authority (RC/RA) and the use of transmission load flow analysis tools (analysis tools) by TSOs to assist NPPs in monitoring grid conditions to determine the operability of offsite power systems under plant technical specifications (TSs). (The TSO, ISO, or RA/RC is responsible for preserving the reliability of the local transmission system. In this GL the term TSO is used to denote these entities);

(2) use of NPP/TSO protocols and analysis tools by TSOs to assist NPPs in monitoring grid conditions for consideration in maintenance risk assessments;

(3) offsite power restoration procedures in accordance with Section 2 of NRC Regulatory Guide (RG) 1.155, "Station Blackout;" and

(4) losses of offsite power caused by grid failures at a frequency equal to or greater than once in 20 site-years in accordance with RG 1.155.

There are no commitments included in this response to GL 2006-02.

GL 2006-02 requested that this information be submitted pursuant to 10CFR50.54(f). Pursuant to 10CFR50.54(f) the following affirmation is provided:

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A123

Brian Katz states that he is Vice President of Southern California Edison, is authorized to execute this oath on behalf of Southern California Edison and, to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

Brian Katz
Vice President
Southern California Edison

State of California
County of San Diego

Subscribed and sworn to (or affirmed) before me on this 3rd day of April, 2006,

by Brian Katz,

personally known to me or proved to me on the basis of satisfactory evidence to be the person who appeared before me.

Dawn A. Farrell
Notary Public

DAWN A. FARRELL
Commission # 1623106
Notary Public - California
San Diego County
My Comm. Expires Nov 20, 2009

Enclosure:

cc: B. S. Mallett, Regional Administrator, NRC Region IV
N. Kalyanam, NRC Project Manager, San Onofre Units 2 and 3
C. C. Osterholtz, NRC Senior Resident Inspector, San Onofre Units 2 and 3

Enclosure 1

Response to Generic Letter 2006-02,

"Grid Reliability and the Impact on

Plant Risk and the Operability of Offsite Power

The questions provided in Generic Letter (GL) 2006-02 generically use the term TSO to refer to Transmission System Operators (TSOs), Independent System Operators (ISOs), and Reliability Coordinator/Authorities (RC/RA). SONGS responses to these questions refer to three different entities whose functions are described below.

California Independent System Operator (CAISO)

The CAISO has operational control over selected lines and equipment within the SCE service territory. The CAISO is responsible to provide non-discriminatory open access to the transmission system. Generation and dispatch functions are performed by the CAISO. The CAISO does not own or maintain the transmission system or generation equipment.

Southern California Edison (SCE) Grid Control Center (GCC)

The GCC is the primary point of contact with the CAISO and supervises the routine and emergency operations of the SCE transmission grid. The GCC is to be promptly notified of all events occurring on the electrical system which may affect service to customers.

Southern California Edison (SCE) Generation Operations Center (GOC)

The GOC is responsible for bidding and scheduling SCE owned generation assets. The GOC is the primary contact with the CAISO for all SCE generation bidding and dispatch.

The TSO for SONGS is the CAISO. CAISO functions related to SONGS offsite power requirements, however, are monitored and implemented jointly between the GCC and CAISO pursuant to SCE's Transmission Control Agreement with the CAISO and pursuant to Operating Procedure, OP-13, "SONGS Voltage" (see Response to 1(a), below). SONGS personnel communicate primarily with the GCC and only rarely communicate directly with the CAISO. While the CAISO retains responsibility for all of these actions, SCE's use of the term "TSO" in the following responses refers to GCC/CAISO joint monitoring/implementation of CAISO's responsibilities.

Some of the questions asked in GL 2006-02 seek information regarding analyses, procedures, and activities concerning grid operation which SONGS may not have first-hand knowledge and which are beyond the control of SONGS. The TSO was consulted during the preparation of the responses and although the TSO-based information is understood to be true and correct today, the TSO may institute changes in its operations in the future as deemed necessary and/or appropriate to perform its functions.

NRC Questions and Responses

1. 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.

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

   **Response:**

   Yes, Southern California Edison (SCE) has a formal agreement with the California Independent System Operator (CAISO) defining the San Onofre Nuclear Generating Station (SONGS) 2 & 3 requirements for offsite power. This agreement is the Transmission Control Agreement, Appendix E (Nuclear Protocols). This agreement and protocol for determining operability of the offsite power sources is implemented via the SCE Grid Control Center (GCC) Operating Procedure, OP-13, "SONGS Voltage."

   (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.

   **Response:**

   There are two conditions that would trigger notification from the Transmission System Operator (TSO); 1) if the SONGS offsite power sources should be considered inoperable, or 2) if certain maintenance activities need to be restricted.

   1) Offsite Power Source Inoperability

   The Transmission Control Agreement requires the TSO to notify SONGS when all of the following conditions occur:

      1. One SONGS unit is off-line
      2. A critical line(s) outage has occurred (as defined in SCE's Operating Procedure OP-13)
      3. The SONGS switchyard operating point, based on MVAR flows, import levels, and grid configuration on the applicable nomogram is outside the OPERABLE region. This condition would indicate that following a trip of the single remaining operating SONGS unit, SONGS post-trip switchyard voltage would drop and remain below the minimum required voltage of 218 kV.

Unless BOTH conditions 1 and 2 above exist, there is no known case that would result in unacceptable voltage following a trip of a SONGS unit. When BOTH conditions 1 and 2 above exist, existing procedures state that the TSO has one (1) hour to assess operability of off-site power as defined by number 3 above and notify SONGS.

2) Restricted Maintenance Operations

In addition, CAISO procedures direct the CAISO to issue a Restricted Maintenance Operations (RMO) declaration when it is believed that the loss of major system elements could place CAISO in a marginal condition with respect to reserves and/or reliability. During an RMO period, SONGS procedures state that work or adjustments may be performed on certain critical components only after contacting the CAISO via the Generation Operations Center (GOC) immediately before disabling equipment or starting work.

(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.

**Response:**

SONGS is required, by procedures, to contact the TSO when it is determined that one or more of the following conditions are met:

- Switchyard Hi/Lo Voltage
- Switchyard Hi/Lo frequency
- Transmission Line Trouble or Lo Voltage
- Switchyard Breaker Trouble or Trip
- Loss of Offsite Power to SONGS
- Planned or Unplanned Unit Downpower (GOC is contacted)

Procedures for alarm responses:

- SO2-15-63.B, Annunciator Panel 63B Train "A" Switchgear, (e.g. alarm 63B51, "Offsite Power Trouble"),
- SO23-15-63.D, Annunciator Panel 63D Switchyard/Penetration Switchgear, (e.g. alarm "63D60 Northwest 220 KV Bus Differential Trip")
- SO23-15-63.E, Annunciator Panel 63D Switchyard, (e.g. 63E34 Viejo Line Trouble and 63E35 Viejo Line Voltage Lo).

Abnormal Operating Instruction (AOI) SO23-13-4, Operation During Major System Disturbances, requires GCC communication during off-normal grid conditions. Emergency Operating Instruction (EOI) SO23-12-11,

Attachment 8, "Restoration of Offsite Power," requires GCC communication following a Loss of Offsite Power.

Procedures for Unit downpower notifications:

- SO23-5-1.7, Power Operations
- SO123-0-A7, Notification and Reporting of Significant Events

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

**Response:**

Licensed operators are trained and tested prior to receiving their NRC license. Licensed operators, through their continuing training program, receive training and testing both in the classroom and in the simulator.

(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.

**Response:**

Response not required. SONGS has a formal agreement.

(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 setpoint value requirements; including NPP licensees using allowable value in its TSs) or LOOP after a trip of the reactor unit(s).

**Response:**

As described in the response to 1(b), the TSO is required by procedure to contact SONGS when postulated post-trip switchyard voltages would be inadequate. See the response to questions 1(g) and 2(c), below, for the relationship between adequate post-trip switchyard voltage and the SONGS degraded voltage TS allowable values.

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

**Response:**

Sustained switchyard voltages below 218 kV could initiate operation of the plant degraded voltage protection. The degraded voltage protection senses Class 1E 4.16kV bus voltages and which are dependent upon the switchyard voltage and the bus loading.

The SONGS undervoltage protection scheme provides two distinct degraded voltage signals: Degraded Grid Voltage with a SIAS Signal (DGVSS) and Sustained Degraded Voltage Signal (SDVS).

The DGVSS is designed to respond to a degraded voltage condition that is caused by a trip of a SONGS unit due to a worst-case design basis accident [as indicated by initiation of a Safety Injection Actuation Signal (SIAS)]. When a SIAS is present during the degraded switchyard voltage condition, the Class 1E 4.16 kV bus voltage is checked and will be found to be acceptable only if the switchyard voltage recovers above 218 kV.

A SDVS is generated in approximately 112 seconds if the Class 1E 4.16 kV bus voltage remains below a level that would be equivalent to 218 kV in the switchyard.

In addition to the two degraded voltage signals, the SONGS undervoltage protection scheme includes a Loss of Voltage Signal (LOVS) which is designed to detect a complete loss of voltage on the offsite power sources.

The second offsite power source (alternate preferred power source) is designed for providing power to the Class 1E equipment of both units simultaneously at the normal switchyard operating voltage of 226 to 232 kV. The alternate preferred power supply is treated as a delayed source per 10CFR50 Appendix A, General Design Criterion 17. The alternate preferred power source, even though automatically available, is not designed for auto loading (sequencing) of the required Class 1E loads following a Loss of Coolant Accident (LOCA) at the emergency condition minimum switchyard voltage of 218 kV.

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

   (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.

**Response:**

Yes. The TSO analysis tools are nomograms which are used to determine if the off-site power sources are OPERABLE. Nomograms graphically define the OPERABLE region of system conditions for critical transmission line outage scenarios. Hardcopy (offline) versions of these nomograms are also available.

(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?

**Response:**

Yes, as described in the response to 1(b) and 2(a).

(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 TSs) and consequent actuation of plant degraded voltage protection? If not, discuss how such a condition would be identified on the grid.

**Response:**

Yes. As described in the responses to 1(b), 1(g), and 2(a), the TSO uses nomograms to determine if a trip of a SONGS operating unit would result in switchyard voltages below the required minimum (218 kV). The Technical Specification allowable values ensure that the SONGS plant degraded voltage protection (DGVSS) will not be actuated if the switchyard voltage recovers to 218 kV within a few seconds after a SONGS unit trips with SIAS. The degraded voltage protection scheme senses 4.16 kV bus voltages which are dependent upon the switchyard voltage and the bus loading.

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

**Response:**

The on-line display dynamically updates the nomogram parameters according to a user-entered time interval, with a default of 5 minutes. The TSO operator can increase the frequency of the update of real-time parameters at any time if they are monitoring more closely due to more quickly changing system conditions. In addition, the hardcopy versions of the nomograms may be consulted at any time.

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

**Response:**

The nomograms described in the response to 2(a) cover critical line outage conditions (currently fourteen [14]) that, along with the grid conditions described in the response to 1(b), could potentially trigger notification to SONGS by the TSO. In addition, procedures state that in the event that a line crossing outage or other combination of outages does occur and which, in the TSO operators' judgment, could be more limiting than the critical lines defined in OP-13, by default SONGS offsite power source would be considered inoperable and notification would be provided.

(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?

**Response:**

Yes. As described in 3(e) above, in the event of conditions which, in the TSOs' judgement, could be more limiting than the critical lines defined in OP-13, the procedure states that the TSO will notify SONGS that the offsite power sources should be considered inoperable and the applicable Limiting Condition for Operation (LCO) is entered for each Unit.

(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?

**Response:**

No. The resultant switchyard voltages are not required by procedure to be verified as bounded by the voltages predicted by the analysis tool. (The analysis tool, i.e. nomograms, determines, if upon loss of the single remaining SONGS unit the post-trip switchyard voltages would be below the minimum required 218 kV. This tool does not predict a specific post-trip switchyard voltage.)

(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?

**Response:**

Response not required. As described previously, analysis tools are available.

(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?

(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?

**Response:**

While analysis tools are available, an annual assessment is required by the Transmission Control Agreement, Appendix E. This assessment is to be conducted by the TSO to ensure that changing grid conditions do not adversely impact the nomograms.

(b) If the bounds of the analyses are exceeded, does this condition trigger the notification provisions discussed in question 1 above?

**Response:**

While analysis tools are available, if a line-crossing outage or other outage occurs which, in the judgement of the TSO could be more limiting than the loss of an analyzed critical line, their procedures state that offsite power would be considered inoperable by default and SONGS would be notified.

(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.

**Response:**

Response not required. Analysis tools are available.

3. 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.

   (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?

   **Response:**

   Yes. AOI SO23-13-4, Operation During Major System Disturbances ensures both offsite sources are declared inoperable in accordance with LCO 3.8.1 or LCO 3.8.2 when notified by the TSO that trip of a SONGS unit would result in inadequate post-trip switchyard voltage. Analyses have shown that the loss of a critical transmission line or generation supply to the grid would not in and of itself result in insufficient SONGS switchyard voltage. As described in the response to Question 1(b), multiple conditions must be met to cause insufficient switchyard voltage.

   (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?

   **Response:**

   If any safety-related equipment is found to be incapable of performing its safety function, it is declared inoperable.

   As described in the response to question 3(c), the design of SONGS' undervoltage protection scheme provides protection against the potential for a double sequencing scenario.

   (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).

**Response:**

The design of SONGS' undervoltage protection scheme provides protection against the potential for a double sequencing scenario when a unit trip could cause a degraded voltage condition.

As described in the response to Questions 1(b) and 3(a), in most instances a trip of a SONGS unit will not cause a degraded voltage condition in the SONGS switchyard. In those cases where trip of a SONGS unit could cause a degraded voltage condition, SONGS is notified by the TSO and declares the offsite power source inoperable and enters TS 3.8.1. While operating in this action statement, the potential for a double sequencing scenario is minimized by the design of the DGVSS.

The degraded voltage protection scheme senses 4.16kV bus voltages which are dependent upon the switchyard voltage and the bus loading. The normal preferred power source has been analyzed to provide a minimum of 4161V on all the Class 1E buses under worst case loading at the minimum switchyard voltage of 218kV. To account for the deadband of the undervoltage relays, 4106 V has been used to determine operability of all Class 1E equipment. The plant degraded voltage relays have been set to trip above the bus voltage of 4106 with a response time of 2 seconds and reset below 4161V.

Whenever there is a unit trip involving an SIAS, the SONGS degraded voltage scheme detects 4.16kV Class 1E bus voltage and, if voltage is degraded, generates a DGVSS. This signal is generated in approximately 4.3 seconds after SIAS by utilizing 2 out of 4 relay logic along with time delay relays. The DGVSS window is kept active for approximately 1.25 seconds and then blocked. This scheme allows starting of only step one (0 second) loads and trips the normal preferred power source before the second step (5 seconds) loads start if the switchyard voltage is below the minimum acceptable degraded voltage. Upon initiation of a DGVSS, the alternate preferred power source is blocked by the signal, and the 4.16 kV Class 1E buses will transfer directly to the Emergency Diesel Generators (EDGs).

Should the switchyard voltage recover above 218 kV prior to the opening of the DGVSS sensing window (i.e., the unit trip does not cause a degraded voltage condition), the DGVSS scheme will block a degraded voltage signal after load step one. This is because if voltage has recovered above 218 kV, the loads can safely start and run. Thus, double sequencing is avoided because the Class 1E buses remain connected to the normal preferred power source.

LOVS and SDVS are not blocked for equipment protection purposes.

(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.

**Response:**

No. Except for the conditions noted above in response to Question 3a, there are no anticipated grid conditions that would, by procedure, cause the TSO to notify SONGS that the offsite power sources are inoperable.

(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.

**Response:**

SONGS TSs require offsite power systems to be declared inoperable for the circumstances described above in 3a.

Other safety-related equipment is not declared inoperable due to the protection provided by the design of the DGVSS signal, which minimizes the potential for a double sequencing scenario as described in the response to Question 3(c).

(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).

**Response:**

Licensed operators are trained and tested on the required actions of AOI SO23-13-4, "Operation during Major System Disturbances," prior to receiving their NRC license and through their continuing training program.

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

(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.

**Response:**

Yes. The main generator voltage regulator is credited in some of the analyzed offsite power system operability analyses. Operating Procedure SO23-6-28 requires the GOC to be notified whenever the main generator voltage regulator is not in the automatic operating mode.

SONGS operators are trained and tested on the use of this procedure.

(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.

**Response:**

Response not required. Plant procedures 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.

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

(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?

**Response:**

Yes. To comply with requirements of 10CFR50.65(a)(4), SONGS procedure SO123-XX-10, "Maintenance Rule Risk Management Program Implementation," includes guidance for the SONGS Work Control group (WC) to perform risk assessments using the Safety Monitor (SONGS'

on-line risk assessment tool) for each workweek prior to the actual work as part of the maintenance planning process. Additionally, this procedure directs the on-shift operations personnel (i.e., Shift Technical Advisers (STAs)), on a shiftly basis, to perform risk assessments using the Safety Monitor for the actual current plant configuration (including scheduled and emergent work) prior to submitting the work package to the Control Room. WC and STAs are required by procedure to initiate risk management actions or request that the work activity be rescheduled should risk of the configuration exceed predefined risk thresholds.

Grid reliability is reflected in the Loss of Offsite Power (LOOP) event frequency used in the SONGS Safety Monitor. Due to lack of SONGS-specific LOOP data, the likelihood of a LOOP event is based on the actual industry-wide occurrences of LOOP events from all causes from 1980 through 2003 and includes the eight August 2003 Northeast grid blackout events. The calculated average LOOP initiating event frequency used in the Safety Monitor serves as a measure of grid reliability on any given day. Also included in the risk assessment is the probability of a LOOP event caused by a plant trip. The conditional probability of a LOOP event given a plant trip (due to any evaluated initiating event) is based on the same data as the LOOP average frequency (i.e., actual industry-wide LOOP events). The LOOP average frequency used in the SONGS Safety Monitor is conservative because it includes relevant LOOP events for all regions and not just the LOOP events in the Western region (i.e., Western Electricity Coordinating Council (WECC)).

The user of the Safety Monitor can increase the average LOOP frequency (i.e., use more conservative values) to reflect unusual external conditions being evaluated (e.g., potential degraded grid voltage, tornado warning, external fires, high impact switchyard work, etc.). To comply with the provisions of NUMARC 93-01 (i.e., consideration of unusual external conditions), selected environmental factors have been incorporated into the Safety Monitor to quantitatively address the potential impact of unusual external conditions on offsite power reliability/availability by increasing the average LOOP event frequency.

Depending on the unusual external condition being evaluated, different environmental factors may be used by personnel at SONGS responsible for performing risk assessments. For example, by procedure WC conservatively assumes the "high impact switchyard work" is in effect for each workweek as directed by SO123-XX-10 (even though access to the switchyard is restricted by procedure during certain grid-risk-sensitive maintenance activities.). STAs use an environmental factor for other external conditions if present or imminent in their Safety Monitor risk assessments.

(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?

**Response:**

Yes. As described in the responses to question 1(b), the TSO monitors grid status to confirm that the SONGS offsite power sources are OPERABLE.

Unless the CAISO/GCC notifies SONGS that the offsite power sources are inoperable, SONGS personnel use the Safety Monitor with a baseline LOOP event frequency to assess the configuration risk and to determine the compensatory actions required when scheduling equipment outages (although, as discussed in the response to Question 5(a), the environmental factor for high impact switchyard work is always turned on for conservatism). Once the CAISO/GCC informs SONGS that offsite power sources to the site should be considered inoperable, plant operators will enter the procedure SO23-13-4, "Operation During Major System Disturbances," and (1) declare offsite power inoperable and enter LCO 3.8.1, (2) evaluate accelerating return to service of safety related equipment, and (3) perform risk assessments prior to removal of other equipment from service. Procedures state that a reassessment of the plant risk will be performed, as time allows, using the Safety Monitor in view of an emergent condition (i.e., degraded grid reliability) that may affect the results of an existing maintenance risk assessment, in compliance with 10CFR50.65(a)(4).

Additionally, SO123-XX-10 directs the on-shift operations personnel (i.e., STA), on a shiftly basis, to perform risk assessments using the Safety Monitor for the actual current plant configuration and if needed, initiate risk management actions or request that the proposed new work activity be rescheduled.

(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.

**Response:**

No. Stress on the grid is affected by several factors, including system demand, network configuration, and availability of reactive resources (including static devices in the form of capacitors, and dynamic facilities in the form of generators and static VAR compensators).

LOOP is related to stress on the grid inasmuch as higher system load (e.g., peak summer conditions), abnormal network conditions (e.g., transmission lines out due to maintenance activities, inclement weather, fires, etc.), and unavailability of reactive resources (e.g., generating units and shunt capacitors within electrical proximity to SONGS) all tend to exacerbate the risks for LOOP.

PWhile stress on the grid is affected by each of these factors, deficiencies in one factor are typically counterbalanced by adjustments in the other factors. For example, during summer peak demand conditions the network is kept as normal as possible and all available generation is typically online. Conversely, during winter light demand conditions transmission outages are allowed for maintenance activities, and many of the generating units may be off due to maintenance or market conditions.

As such, there is no predictable seasonal variation to the LOOP frequency in the transmission region that supplies offsite power to SONGS.

Generic Letter 2006-02 states in the Discussion section that,

> "Recent NRC studies that have found that since 1997, LOOP events have occurred more frequently during the summer (May through October) than before 1997, that the probability of a LOOP event due to a reactor trip has also increased during the summer months, and the durations of LOOP events have generally increased."

However, a recent Electric Power Research Institute (EPRI) Report TR-1011759, "Frequency Determination Method for Cascading Grid Events," dated December 2005, has shown that there is no statistically significant seasonal variation in the recorded grid-centered LOOP events in any region (including the WECC) from 1997 to 2004 including the August 2003 Northeast grid blackout events (page 4-6 of TR-1011759).

(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?

**Response:**

SONGS does not have any evidence showing time-related variability in the LOOP frequency at the plant. According to recent preliminary work performed by the Pressurized Water Reactors Owners Group (WCAP-16565-P, "Considerations for Risk-Informed Modeling Grid Centered Loss Of Offsite Power Events"), there is no statistically significant time-of-day or day-of-week variation in the frequency of actual LOOP events at nuclear power plants. This may be largely due to the small number of LOOP events.

The treatment of LOOP events in the SONGS risk assessments is considered conservative because (1) the LOOP average frequency conservatively includes relevant LOOP events for all regions and not just the LOOP events in the Western region (i.e., WECC), and (2) the risk assessments performed for the purposes of 10CFR50.65(a)(4) assume that "high impact switchyard work" is in effect for each workweek, which further increases the baseline LOOP frequency used in the Safety Monitor. SCE considers that these built-in conservative features in the Safety Monitor would compensate for any minor time-related variations in the LOOP frequency on a given day.

Although no explicit seasonal variability in the LOOP frequency is included in the Safety Monitor, its users can increase the average LOOP frequency (i.e., use more conservative values) to reflect the unusual severe weather conditions being evaluated (e.g., tornado warning or external fires) or any other condition that could result in degraded grid voltage.

(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?

**Response:**

Yes. SONGS procedure SO123-XX-10, "Maintenance Rule Risk Management Program Implementation," includes guidance for Work Control to perform risk assessments using the Safety Monitor for each workweek prior to the actual work as part of the planning process. At this rolling maintenance planning stage, the CAISO/GCC can provide no statistically valid input to the process well in advance of the actual work.

SONGS does, however, coordinate with the TSO prior to certain grid-risk-sensitive maintenance activities. Procedures state that SONGS coordinates with the TSO any time the Diesel Generator Allowed Outage Time (AOT) is entered and for all Higher Risk Evolutions (HREs are defined by procedure as outage activities, plant configurations, or conditions during shutdown where the plant is more susceptible to an event causing the loss of a Shutdown Safety Function). This coordination

does not result in changes to the LOOP frequency used in the 10 CFR 50.65(a)(4) risk assessment. Also, daily (current) updates of grid conditions are not maintained once the Switchyard Restriction or HRE window has commenced (See 5(g) below).

(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.

**Response:**

As described in responses to Questions 1(a) and 1(b), the formal agreement is Appendix E of the Transmission Control Agreement. This agreement is implemented via the SCE GCC Operating Procedure OP-13 which states that the TSO should notify SONGS within an hour whenever the offsite power sources should be considered inoperable.

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

**Response:**

No. The TSO has procedures to contact SONGS when required (e.g. Offsite Power inoperability or Restricted Maintenance Operations). These communication protocols are established to minimize unnecessary distractions to the on-shift Operations personnel.

(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.

**Response:**

All formal communications with the TSO are through Licensed Operators. Licensed Operators are trained and tested on the execution of actions required following formal notification of inoperability of the offsite power sources. This training and testing occurs during both the Initial Licensed Operator Training Program and the Licensed Operator Requalification Training Program as stated in the response to Question 1(d).

(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).

**Response:**

As discussed in the response to Question 5(b), the grid reliability evaluation SONGS performs as part of the maintenance risk assessment does rely on formal communications with the TSO.

(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.

**Response:**

As discussed previously, grid status is monitored by the TSO. To comply with the provisions of NUMARC 93-01, SONGS re-assesses risk whenever information is received from the CAISO/GCC regarding significant changes to grid conditions. This practice is not limited to grid-risk-sensitive maintenance activities. Once the CAISO/GCC informs SONGS that offsite power sources to the site are degraded or inoperable (per GCC procedure OP-13), plant operators will enter the procedure SO23-13-4, "Operation During Major System Disturbances," and (1) declare offsite power inoperable and enter LCO 3.8.1, (2) evaluate accelerating return to service of safety related equipment, and (3) perform risk assessments prior to removal of other equipment from service. Procedures state that a reassessment of the plant risk will be performed, as time allows, using the Safety Monitor in view of an emergent condition (i.e., degraded grid reliability) that may affect the results of an existing maintenance risk assessment, in compliance with 10CFR50.65(a)(4).

(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.

**Response:**

Response not required. SONGS complies with 10 CFR 50.65(a)(4) and the associated endorsed industry guidance.

6. 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).

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

**Response:**

Yes, SCE Operating Procedure OP-13 describes the critical transmission lines and system conditions that can have an impact on plant operation (as described in the response to 2(e)) and the TSO has been requested to avoid maintenance on these critical facilities whenever one SONGS unit is off-line.

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

**Response:**

Yes. Procedures state that SONGS will coordinate with and receive approval from the GCC and/or GOC via an Outage Program Request for all planned SONGS maintenance activities that can have an impact on the transmission system. Unplanned (emergent) activities are also coordinated with the GCC and/or GOC as required via direct communication between the affected SONGS Control Room and the GCC or GOC.

(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?

**Response:**

Yes. HREs and Diesel Generator AOTs are scheduled and approved as described in Item 5(e) above. During these activities, grid-risk-sensitive activities are rescheduled (not allowed); or, the Diesel AOT or HRE is rescheduled. Also, under certain grid conditions (RMO windows), work on critical components is controlled by procedure. This procedure requires the CAISO/GOC notification for work on the trip-sensitive and risk-sensitive components. During RMO windows, work on risk-sensitive components is routinely rescheduled.

(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.)

**Response:**

Yes. As described in the response to Question 6(c) above, in coordination with the CAISO and GCC, SCE's preferred approach is to re-schedule the activity if at all possible. The circumstances would describe the necessary actions on a case-by-case basis and would be dealt with accordingly. Considerations would include contingency plans, enhanced alternate equipment protection (e.g. barriers), and other mitigating alternatives based on the specific situation (including the use of available information contained in the RMO controls and HRE/Switchyard Restriction controls mentioned above).

(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.

**Response:**

The response to question 6(a) states that the TSO is aware of critical transmission lines and system conditions and avoids maintenance on these critical facilities whenever one SONGS unit is off-line. Critical transmission lines are listed in GCC procedure OP-13.

The response to question 6(b) states that SONGS coordinates with and receives approval from the CAISO through the GCC or GOC for all planned and emergent SONGS maintenance activities that can have an impact on the transmission system. These communication protocols are described in System Operating Bulletins: No. 12, Reports to Grid Control Center; No. 85, Reports to the Generation Operation Center, Reports to; No. 103, Outage Requests, Operating & Maintenance Jurisdiction of SCE Generating Station Switchrack Facilities; No. 104, Outage Request Procedures; No. 216, SCE/SDG&E, SONGS Operating Instructions & Clearance Procedures; No. 216 Attachment A, San Onofre Nuclear Generating Station 220/230 Kv Switchyard Work Practices.

The response to question 6(c) states that during HREs (SO23-5-1.8.1) and Diesel Generator AOTs (SO23-2-13), other grid-risk-sensitive activities are rescheduled (not allowed) or the Diesel AOT or HRE is rescheduled. Also, under certain grid conditions (RMO windows), work on critical components is controlled in accordance with SO123-XX-5, Work Authorizations, Attachment 6. This attachment requires CAISO/GCC notification for work on the trip-sensitive and risk-sensitive components. During RMO windows, work on risk-sensitive components is routinely re-scheduled.

The response to question 6(d) states that in coordination with the CAISO and GCC, SCE's preferred approach is to re-schedule the activity if at all

possible. The circumstances would describe the necessary actions on a case-by-case basis and would be dealt with accordingly. Considerations would include contingency plans, enhanced equipment protection (e.g. barriers), and other mitigating alternatives based on the specific situation (including the use of available information contained in the RMO controls and HRE/Switchyard Restriction controls mentioned above). The procedural guidance is contained in procedure SO123-XX-5, Work Authorizations, Attachment 6.

These actions will be accomplished consistently because they are addressed in the described procedures and personnel are trained and tested as described in the response to 6(f) below.

(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).

**Response:**

All formal communications with the TSO are through Licensed Operators. Licensed Operators are trained and tested initially and receive periodic retraining and testing on the content and implementation of the following procedures listed in the response to Question 6(e):

- SO23-5-1.8.1
- SO23-2-13
- SO23-XX-5

(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).

**Response:**

Response not required.

(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.

**Response:**

Response not required. SONGS implements appropriate risk management actions.

(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).

**Response:**

Response not required.

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

Note: Section 2, "Offsite Power," of RG 1.155 (ADAMS Accession No. ML003740034) states:

> Procedures should include the actions necessary to restore offsite power and use nearby power sources when offsite power is unavailable. As a minimum, the following potential causes for loss of offsite power should be considered:
>
> - Grid undervoltage and collapse
> - Weather-induced power loss
> - Preferred power distribution system faults that could result in the loss of normal power to essential switchgear buses

(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.

**Response:**

SONGS has a contractual agreement with CAISO per Transmission Control Agreement, Appendix E. In the event of loss of the SONGS offsite power supply, the agreement states that the highest possible priority shall be given to restoring power to the SONGS switchyard. The agreement requires that TSO procedures and training should consider several potential methods of transmitting power from black-start capable units to the SONGS switchyard.

System Operating Bulletin 1-A is used for restoring offsite power to SONGS on first priority basis. This bulletin establishes guidelines for locating a source of power and routing the power through the electrical system to the SONGS auxiliaries during restoration of the electrical system. The CAISO has the authority to start all available generation connected to the grid. If communication is unavailable between the CAISO

and SCE GCC, the GCC has the authority to dispatch available generation that may remain on-line for auxiliary power to SONGS. The Big Creek and Hoover Projects (hydro units) are normally available to provide black start capability and are capable of rapid starts with quick load response.

CAISO Procedure T-112, "Offsite Power Requirements for Nuclear Power Plants," states that San Diego Gas and Electric's Kearny Combustion Turbine plant should also be available to provide black start capability and is capable of a rapid start with quick load response.

(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.

**Response:**

No. SONGS operators are trained and tested on the NPP (onsite) activities for restoration of offsite power. The CAISO or GCC identifies and directs available power sources and routes their output to SONGS to restore offsite power.

(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.

**Response:**

Response not required. As described in the response to 7(a), an agreement is in place to restore power to SONGS following a LOOP event.

8. Maintaining SBO coping capabilities in accordance with 10 CFR 50.63.

(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?

**Response:**

No. NUREG/CR-6890 Volume 1, defines a LOOP as, "the simultaneous loss of electrical power to all unit safety buses...requiring all emergency power generators to start and supply power to the safety buses." SONGS Units 2 and 3 have not experienced a total LOOP.

(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?

**Response:**

Response not required.

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

**Response:**

Response not required.

(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.

**Response:**

Response not required.

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.

**Response:**

Response not required.