Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

January 16, 1992

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

Subject: LaSalle County Nuclear Station Units 1 and 2
Response to Notice of Violation
Inspection Report Nos. 50-373/91019; 50-374/91019
NRC Docket Nos. 50-373 and 50-374

Reference: Brent Clayton letter to Cordell Reed dated December 13, 1991 transmitting NRC Inspection Report 50-373/91019; 50-374/91019

Enclosed is Commonwealth Edison Company's (CECo) response to the subject Electrical Distribution System Functional Inspection (EDSFI) Report which was transmitted with the referenced letter. The Inspection Report cited two Level IV violations, 4 deviations, 2 unresolved items, and 2 open items. CECo's response to these items is provided in Attachments A, B, C and D respectively.

If your staff has any questions or comments concerning this letter, please refer them to Annette Denenberg, Compliance Engineer at (708) 515-7352.

Very truly yours,

T.J. Kovach
Nuclear Licensing Manager

Attachment

cc: A. Bert Davis, NRC Regional Administrator - RIII
B. Siegel, Project Manager - NRR
T. Tongue, Senior Resident Inspector
Z. Falevits - RIII

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ATTACHMENT A
RESPONSE TO LEVEL IV VIOLATION
INSPECTION REPORT
50-373/91019, 50-374/91019

VIOLATION: IR 373/91019-01A

10CFR50, Appendix B, Criterion XI, states that, "A test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents . . .. Test results shall be documented and evaluated to assure that test requirements have been satisfied."

Contrary to the above, prior to October 22, 1991, the licensee performed an instantaneous trip test on five 480Vac safety related air circuit breakers using a trip current of 20 to 40 times the normal current rating of the breaker trip coil, rather than the maximum 15 times specified by the vendor.

This is a Severity Level IV violation (Supplement I).

REASON FOR THE VIOLATION:

CECo agrees that this is a violation. Originally, values of current were provided to LaSalle County Station which were designated as Test Currents. These values were typically four times the actual trip setting so that repeatability of trip times would be assured. These test currents sometimes exceeded the rating of the trip coil by greater than 20 times. The largest test current used was 40 times the rating of the coil. The limit of 20 times the coil rating was not available to the Station via vendor published maintenance information. This value has since been given by the Manufacturer as an upper limit (not 15 as specified in the NOV).

CORRECTIVE STEPS THAT HAVE BEEN TAKEN AND RESULTS ACHIEVED:

All in-service safety-related breakers which had been tested with elevated currents were retested to assure that the breakers were not damaged by the elevated currents. Testing of these breakers was completed on November 7, 1991. None of the breakers had any signs of damage as a result of the elevated current levels.

CORRECTIVE STEPS THAT WILL BE TAKEN TO AVOID FURTHER VIOLATIONS:

Station procedures have been revised to ensure that the limit of 20 times the coil rating is not exceeded.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED:

Full compliance was achieved on November 7, 1991.

ATTACHMENT A
RESPONSE TO LEVEL IV VIOLATION
INSPECTION REPORT
50-373/91019; 50-374/91019

VIOLATION: IR 50-373/91019-01B

10CFR50, Appendix B, Criterion XI, states that, "A test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents . . .. Test results shall be documented and evaluated to assure that test requirements have been satisfied."

Contrary to the above, prior to October 24, 1991, the licensee failed to include safety-related relays K-32, K-33, and K-39 in the Station's calibration program.

This is a Severity Level IV violation (supplement I)

REASON FOR THE VIOLATION:

CECo agrees that this is a violation. Presently, LaSalle County Station does not check timing relays to verify settings. The station does however utilize both logic test and functional tests on safety-related systems to ensure that the system and its associated components (including time delay relays) perform their intended function. When required by the Technical Specification, timing relays are calibrated to ensure that the specified time delay will occur in a predetermined interval. These tests are performed per planned surveillance requirements on a periodic basis and documentation is obtained to show that the relays and other components functioned as designed in their respected circuits.

CORRECTIVE STEPS THAT HAVE BEEN TAKEN AND RESULTS ACHIEVED:

The identified relays have not had the time delays verified; however, they have been and are being tested under the existing surveillance program. This testing is comprised of monthly, semi-annual, and refueling tests. While not individually timed during these tests, the relays are functionally tested to assure compliance with the Technical Specifications. Thus, although the time delays have not been verified, the overall logic requirements have been met, and future testing will be incorporated in the calibration program described below. Therefore, the safety significance is minimal.

CORRECTIVE STEPS THAT WILL BE TAKEN TO AVOID FURTHER VIOLATIONS:

LaSalle Station will review Station electrical design drawings to identify timing relays for which the time delay performs a function that is important to the safety of the plant. After this review is completed, a calibration program will be designed and implemented to further ensure the proper performance of the relays. It is expected that this program will be developed by March 31, 1993 and start implementation at the first refueling outage thereafter.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED:

Full compliance will be achieved prior to startup following the completion of the second refueling outage, for each unit, after March 31, 1993.

ATTACHMENT A
RESPONSE TO LEVEL IV VIOLATION
INSPECTION REPORT
50-373/91019; 50-374/91019

VIOLATION: IR 50-373/91019-07

LaSalle Technical Specification 4.8.1.1.2.d.4 (applicable to both Unit 1 and Unit 2) requires verifying the de-energization of the emergency busses in response to a simulated loss of offsite power.

Contrary to the above, from initial operation through November 8, 1991, the licensee failed to demonstrate the capability of the loss of offsite power undervoltage relay logic circuitry to automatically de-energize the emergency busses for both units.

This is a Severity Level IV violation (Supplement I).

REASON FOR THE VIOLATION:

CECo agrees that this is a violation. During the EDSFI, the NRC team members discovered that two contacts in the undervoltage trip logic (which automatically de-energize the emergency busses for both units) had not been tested during or since the first refueling outage on Unit 1 and Unit 2 at LaSalle County Station. These contacts had been tested during the initial preoperational testing and therefore compliance was maintained through the first cycle of operation on each unit. In each case, the contacts are required to close in order to initiate the trip logic. Although the operation of these contacts had not been tested, the relay itself, including other contacts on the relay, was tested every 18 months. Subsequent testing of the identified contacts determined they all function properly, therefore the safety significance was minimal.

The reason for failing to perform the surveillance is that the contact test steps were not included in the original writing of the surveillance due to an oversight.

CORRECTIVE STEPS THAT HAVE BEEN TAKEN AND RESULTS ACHIEVED:

On November 7, 1991 at 3:00 pm, upon confirmation that the contacts had not been tested by existing station procedures, a procedure was generated to assure that these contacts still performed their intended functions. This test was completed satisfactorily at 10:30 am on November 8, 1991.

CORRECTIVE STEPS THAT WILL BE TAKEN TO AVOID FURTHER VIOLATIONS:

All of the procedures needing this correction have been identified and will be revised by their next required use or 9/9/92, whichever comes first.

Prior to this discovery, LaSalle County Station had been in the process of reviewing bids for a Safety Related contact testing assurance program. This program is being developed to ensure that all relays/contacts which are assumed to be tested to comply with Technical Specifications, are in fact tested by station procedures. This program will be utilized to assure that no further violations occur due to untested contacts. This effort is expected to be completed by May 31, 1994.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED:

Full compliance was achieved November 8, 1991.

ATTACHMENT B

RESPONSE TO DEVIATION
(373/91019-05A(DRS);374/91019-05A(DRS))

STARTING VOLTAGES AT SAFETY RELATED MOTORS

Description of Condition

The team noted that the design documentation for the majority of 4 kV and 480 VAC safety related motors specified that the motor starting voltage must be at least 80% of nominal voltage. This is contrary to UFSAR Section 8.2.3.2.2 which states that all safety related motors are capable of starting with voltage at their terminals equal to 75% of the nominal values. Inadequate motor starting voltages could prevent the motors from performing their safety functions. The licensee acknowledged this concern and indicated that this issue would be addressed as part of the ongoing degraded voltage reviews being conducted at Commonwealth Edison facilities

The team considered the 80% motor starting voltage requirement for safety related motors to be a deviation (373/91019-05A(DRS); 374/91019-05A(DRS)) from the commitment made in UFSAR Section 8.2.3.2.2.

Response

As acknowledged during the EDSFI audit, insufficient documentation exists to demonstrate that most safety related motors are capable of starting at a terminal voltage of 75% of rated voltage. In addition, our investigation of this issue concluded that the safety related motors at LaSalle were not required to meet this specification. The 4 kV and 460 VAC ESF motors for LaSalle were originally specified in accordance with Sargent and Lundy (S&L) Standard Specifications for Alternating Current Motors Constant Speed, Squirrel-Cage Type, Form 1800. This specification contained the following requirements on motor terminal voltage:

1. Motors shall deliver their rated horsepower continuously without damage, when the voltage at the terminals is 10% above or below rated voltage, with rated frequency.

2. Motors shall deliver their rated full load torque without damage when the voltage at the terminals drops to 75% of rated voltage for infrequent one-minute intervals.

These requirements were in accordance with the industry standards (i.e., NEMA MG-1) that existed during the design of LaSalle. Furthermore, no industry standards existed

during the design of LaSalle that provided additional guidelines on motor starting voltages other than those requirements already included in S&L Form 1800. Thus, we believe that the 75% starting voltage requirement contained in UFSAR Section 8.2.3.2.2 was incorrectly derived from the second Form 1800 requirement noted above. This deviation from the UFSAR commitment does not represent a safety issue because the LaSalle auxiliary power system was not designed assuming that any safety related continuous duty motors were able to start with 75% rated voltage applied to their terminals. The LaSalle auxiliary power system was designed to provide adequate starting and running voltages to all safety related loads at the minimum expected switchyard voltage. At the minimum expected switchyard voltage, S&L Calculation 4266/19AZ13 indicates that the starting voltage available at the terminals of the continuous duty, safety related motors will be greater than 80% of motor rated voltage.

In addition, the preliminary calculations that were performed to verify the adequacy of the original degraded voltage setpoint (3814 +/- 76 volts) conservatively used 85% of motor rated voltage as the minimum acceptable starting voltage for all 4 kV and 460 VAC safety related continuous duty motors (see S&L Calculation 4266/19AZ13). Based on these calculations we implemented compensatory measures to ensure that all safety related motors would have adequate starting voltages (see CECo letter dated October 2, 1991). An acceptance criteria of 85% of motor rated voltage for the starting voltage is conservative for the following reasons:

1. ANSI Standard C50.41-1982, Polyphase Induction Motors for Power Generating Stations, requires that medium voltage (4 kV) motors rated 250 hp and above be capable of starting at a terminal voltage of at least 85% of motor rated voltage. Although this standard was not issued until after the design for LaSalle was completed, the design documentation indicates that the 4 kV motors at LaSalle can start with 80% rated voltage at their terminals.

2. Although there are still no industry standards that provide starting voltage guidelines for low voltage (460 V) motors, the 460 V motors at LaSalle will be able to start at a terminal voltage equal to 85% of rated. These motors were specified as NEMA Design B motors and, depending on the size of the load, have a breakaway (starting) torque requirement that varies from 35% to 85% of full load torque. In fact, most of the mechanical loads have a breakaway (starting) torque that is less than 35% of full load torque. Per NEMA Tables MG1-12.37 and MG1-12.38 which provide starting and breakdown torque requirements for low voltage motors, an induction motor which can produce at rated voltage a starting torque equal to 100% of running torque will produce at 80% rated voltage a starting torque equal to 64% of running torque.

This UFSAR deviation will be resolved when the study for the long term solutions for

degraded voltage is completed per the schedule provided in our response to unresolved item (373/91019-06(DRS); 374/91019-06(DRS). This study will identify the actual minimum acceptable starting voltage for all safety related motors, and if this value is different from the starting voltage requirement specified in UFSAR Section 8.2.3 2.2, a revision to the UFSAR will be initiated.

ATTACHMENT B

RESPONSE TO DEVIATION
(373/91019-05B(DRS); 374/91019-05B (DRS)

EDG 2A LOADING

Description of Condition

The team noted that the loading calculation for EDG 2A identified a continuous loading value of 2727kW. This is contrary to UFSAR Table 8.3-1 which states that the continuous loading on EDG 2A is 2627 kW. The team pointed out that the actual EDG 2A loading may be higher than 2727 kW since the existing loading calculation did not account for all EDG losses such as cable losses. The team considered the identified 2727 kW loading of EDG 2A to be a deviation from the commitment made in UFSAR Table 8.3-1.

Response

The problem identified by the team is one of document update. The UFSAR Table revision for EDG 2A loading was submitted on September 23, 1991 to BWR Systems Engineering by Sargent and Lundy, as a result of a review performed as an SSFI commitment. When subsequently sent to the Station for comment, several changes were requested, which resulted in additional revision to calculation 4266/19AK19. These revisions are now in progress. Upon completion, these revisions will be incorporated into the annual UFSAR update.

ATTACHMENT B

RESPONSE TO DEVIATION
(373/91019-05D(DRS);374/91019-05D(DRS))

DEGRADED VOLTAGE SETPOINT METHODOLOGY

Description of Condition

The team determined that the setpoints for the degraded voltage protection relays contained in Table 3.3.3-2 of the Technical Specifications were not based on a setpoint methodology that addressed all known errors associated with this instrument. The licensee, in response to FSAR Question Q31.159, committed to address instrument accuracy, calibration, and drift allowance.

Technical Specification Table 3.3.3-2, Trip Function D.2.a requires 3814 +/- 76 volts. The team's review of historical as-left and as-found data indicated that these relays had drifted as much as -94.5 volts over a 4 month period which exceeded the +/- 76 volt Technical Specification allowance. Sargent and Lundy Calculation 4266/19AN15 also indicated an accuracy of +42 volts is typical for the potential transformers associated with the degraded voltage protection. Additionally, the relay manufacturer and Sargent and Lundy identified other relay tolerances that could add another +/- 38.5 volts to the actual setpoint.

Since the maximum deviation of +/- 76 volts allowed by the Technical Specifications is not large enough to account for these errors and the licensee lacks a setpoint methodology to establish a setpoint with all known errors included, the relays may not detect degraded voltage conditions and transfer safety loads to the emergency diesel generators at a voltage level adequate to ensure proper safety equipment performance or to prevent safety equipment damage. The team considered this to be an example of a deviation (373/91019-05D(DRS); 374/91019-05D(DRS)) from the commitment made in response to FSAR Question Q31.159.

Response

The original analysis for the degraded voltage setpoint determined that the minimum allowable voltage on the 4 kV busses was approximately 3740 volts. The trip setpoint was set about 2% above this value at 3814 volts to account for instrument errors. However, a formal setpoint calculation was not performed to establish the trip setpoint because we did not believe that the commitment made in response to FSAR Question Q31.159 applied to auxiliary power system relays. We believed that the commitment to address all known

instrument errors such as instrument accuracy, calibration, and drift allowance, in determining the setpoint applied only to instruments in the reactor protection, isolation actuation, ECCS, and control rod block systems.

Based on the preliminary calculations that were performed to verify the adequacy of the original degraded voltage setpoint (3814 +/- 76 volts), Engineering recommended in a letter dated October 2, 1991, (ref. 1) that the trip setpoint for the ESF Division 1 and 2 degraded voltage relays be increased to 3885 +/- 5 volts to protect all running motors. The design basis for this setting is contained in S&L Calculation 4266/19AZ13 (ref. 2). The trip setpoint for the ESF Division 3 degraded voltage relays did not need to be changed. In our discussions with the NRC during the EDSFI inspection, we indicated that the revised degraded voltage setpoint of 3885 volts was conservative and did not include any instrumentation errors since the upper Technical Specification limit for this parameter is 3890 volts (3814 + 76V).

Subsequent to our discussions with the NRC, we have performed additional evaluations to determine the impact of instrument error on the operation of safety related equipment and to expand the calibration setpoint tolerances for these relays. These analyses confirm that a setpoint of 3885 V is conservative.

Per references 3, 4, and 5 Engineering increased the setpoint tolerances for the degraded voltage relays from 3885 +/- 5 volts to 3885 +5, -25 volts because the station indicated that these relays could not easily be calibrated to trip within the setpoint tolerances specified in reference 1. Our analysis concluded that the lowest calibration setting of 3860 volts (3885 - 25) would not impact the qualified life of continuously operating motors.

Reference 6 analyzed the affect of an instrument error of 40 volts (1.14 volts on the secondary side) on the operation of safety related equipment. While this value may not include all instrument errors associated with the degraded voltage relays, it does include the effect of repeatability, control voltage input variations, and temperature variations. To perform this analysis, voltage settings of 40 volts below the minimum allowable calibration setpoint of 3860 V and 40 volts above the maximum allowable calibration setpoint of 3890 V were evaluated. This analysis concluded that a drift in the setpoint of 40 volts in either direction will not degrade the level of protection.

A degraded voltage setpoint of 3820 volts (3860 - 40) will not adversely affect the operation of any running equipment either during normal operation or a LOCA. If the bus voltage drops to 3820 volts during normal operation, only five motors will have terminal voltages of less than 90%, and minimum terminal voltage will be equal to 89.4% of motor rated voltage. If the bus voltage drops to 3820 volts during a LOCA, the worst case motor will have a terminal voltage of 88.6% of rated. This terminal voltage is accceptable because it will only result in a small temperature rise in the motor. In addition the duration

of the exposure will be limited because the bus will either be declared inoperable or transferred to the EDG if a LOCA exists before the voltage drops to this level.

Although a setpoint of 3930 volts (3890 + 40) for the degraded voltage relays is above the maximum allowable Technical Specification limit for this parameter, it is not a safety concern. The minimum expected switchyard voltage is 352 kV, and this corresponds to a 4 kV bus voltage of approximately 3955 volts at the maximum expected loading (normal full power operation plus LOCA) on the system with all of the loads being supplied by the SAT. Thus, an upward drift of 40 volts for these relays will not cause any unnecessary transfers to the diesel generators.

As part of the long term solution for degraded voltage, setpoint calculations will be performed for the permanent degraded voltage trip setpoint, and a Technical Specification change request will be submitted if necessary. These calculation will address all known errors associated with these instruments. The schedule for completing this action is provided in our response to unresolved item (373/19019-06(DRS);374/19019-06(DRS)).

References

1. CECo letter dated October 2, 1991 (CHRON # 173799).
2. S&L Calculation 4266/19AZ13, Rev. 0, dated October 7, 1991.
3. S&L letter SCE-5334 dated October 19, 1991.
4. CECo letter dated October 28, 1991 (CHRON # 174756).
5. CECo letter dated October 31, 1991 (CHRON # 175386).
6. S&L Calculation 4266/19AZ17, Rev. 0, dated October 31, 1991, with supplemental memo dated November 6, 1991.

ATTACHMENT B

RESPONSE TO DEVIATION
(373/91019-05C(DRS); 374/91019-05C)

EDG fuel oil transfer and Storage Systems

Description of Condition

The team identified three deviations from ANSI N195 for Units 1 and 2 EDG fuel oil transfer and storage systems that are not listed in the UFSAR Section 9.5.4.2. The team identified the following deviations:

1. The fuel oil storage tanks 1D002T and 2D002T (Units 1 and 2 HPCS) have permanent piped connections to the diesel fire pump day tanks (1/2FP01TA). ANSI N195, however, states, "Permanent interconnections between fuel oil storage tanks and auxiliary equipment other than the standby power system (for example, heating boilers and engine-driven fire pumps) shall not be used".

2. The Division 3 diesel generator fuel oil storage requirement is calculated using the expected load profile without a 10% margin. ANSI N195, however, allows the option of calculating the fuel storage requirements by assuming 100% load continuously or expected load profile plus 10% margin.

3. The diesel generator fuel oil storage tanks have low level alarms, but not high level alarms. ANSI N195, however, calls for low and high level alarms for fuel oil tanks. The fuel oil day tanks have both low level and high level alarms.

Response

In response to Item #1, the permanent connection of the diesel fire pump to the day tank is not safety significant. The HPCS diesel generator fuel oil storage tank is sized to have sufficient capacity to run the HPCS diesel-generator for seven days of conservatively

estimated Division 3 loads following a Loss-of-Coolant Accident (LOCA) and loss of off-site power. A fire in the plant is not postulated in addition to the LOCA scenario. The diesel fire pump day tank contains useable fuel to run the fire pump for more than 14 hours and will only remove fuel from the HPCS diesel-generator fuel oil storage tank when the day tank level has reached the low level setpoint to run the transfer pump. The lines from the storage tanks to the diesel fire pump day tank each have two isolation valves which are operated by fail-close solenoids.

In response to Item #2, the Division 3 fuel oil storage requirement calculations did not include a 10% design margin which could result in a shortage of fuel if the calculation has minor inaccuracies or is outdated. The calculation incorporates conservative assumptions throughout which provides for sufficient design margin to accommodate minor inaccuracies. These conservatisms include the HPCS pump full load run time which is longer than realistic expectations, the use of the greatest pump brake horsepower (although that is not a reasonable system condition) and the auxiliary loads are assumed to be operating 100% through the seven day period. The calculations includes a one thousand gallon margin for diesel testing and fuel sampling. Therefore, the Division 3 fuel oil storage requirements are sufficient.

In response to Item #3, the lack of fuel oil storage tank high level alarms is not safety significant. The storage tank overflows to a diesel fuel sump which has a high level alarm to alert operators of an overflow situation. The sump level is also monitored by regular surveillance checks.

UFSAR section 9.5.4.2 will be revised to mention the fuel oil tank interconnection (Item #1), Division 3 fuel oil storage requirement calculation (Item #2) and lack of storage tank high level alarms (item #3) and why these are deviations from ANSI [illegible].

ATTACHMENT C

RESPONSE TO UNRESOLVED ITEM
(373/91019-03(DRS); 374/91019-03(DRS))

125Vdc Voltage Drop Calculation

Description of Condition

The team determined that 125Vdc voltage drop analyses were not available for Divisions 1, 2, and 3. A pre-operational test was done for Divisions 1 and 2 to ensure all required components operate satisfactorily with 105Vdc at the batteries. However, the team's position was that this test does not eliminate the need for a calculation.

Response

Even though pre-operational tests were successfully performed, the licensee has committed to the following course of action:

1. Perform calculations on all three 125Vdc safety related divisions for both units. Calculations are scheduled to be completed by Jan. 31, 1992. Current results indicated that the Unit 1 and 2 "0" diesel generator main feed breaker closing circuits need significantly more than 105V at the battery terminals due to a large voltage drop. No other significant problems were identified.

2. Engineering work is being performed on an expedited basis to implement minor changes to reduce voltage drop. These minor changes add an interposing relay in the closing circuitry subsequently reducing the overall circuit length. The licensee's goal is to complete the design and installation during the current Unit 2 outage.

Upon completion of the two previous items, all loads requiring more than 105V will be evaluated for further actions.

ATTACHMENT C

RESPONSE TO UNRESOLVED ITEM
(373/91019-06(DRS);374/91019-06(DRS))

4160 VOLT DEGRADED VOLTAGE

Description of Condition

During the team's review of the degraded voltage protection, the licensee provided an October 2, 1991, letter containing the results of preliminary Sargent and Lundy and Bechtel calculations intended to verify the adequacy of the existing degraded voltage relay setpoint (3814 +/- 76 volts). These preliminary calculations indicated that the current setpoint may be non-conservative in that at least 4040 volts is required to start selected emergency loads and that greater than 4040 volts is required to ensure that all motor control circuits will have adequate voltage.

In response to the October 2, 1991, calculation results, the licensee took the following compensatory measures:

* Increased the degraded voltage relay setpoints to 3885 volts.

* Increased undervoltage alarm setpoint to 4040 volts.

* Will declare 4160 volt bus inoperable if voltage is below 4040 volts.

* Will notify the load dispatchers to raise LaSalle switchyard voltage if voltage is less than 4040.

* Will verify proper operation of equipment that required greater that 4040 volts if voltage was below 4040.

Also, the licensee committed to the following future actions:

* Complete motor control circuit (120 volt) voltage drop analysis for Division 3 by November 27, 1991.

* Revise preliminary calculations utilizing actual equipment data by December 31, 1991.

* Finalize dates for all future actions (design changes, Technical Specification

changes, etc.) required to correct any issues resulting from revised calculations by April 30, 1992.

Pending NRC review of the licensee's evaluation of this issue, this is considered an unresolved item (373/91019-06(DRS); 374/91019-06(DRS)).

Response

A. Compensatory Measures

A summary of the compensatory measures that were proceduralized at LaSalle are listed below:

1. The trip setpoint for the ESF Division 1 and 2 degraded voltage relays, 1427(2427)-AP270A/B and AP271A/B, was increased from 3814 V to 3885 V. The trip setpoint for the ESF Division 3 degraded voltage relays did not need to be increased and remains at 3814 V.

2. The trip setpoint for the ESF Division 1 and 2 SAT winding undervoltage relays, 1427(2427)-AP039 and AP251, was increased from 3500 V to 4040 V.

   Note: The function of these relays is to annunciate an alarm in the control room and prevent the SAT feed breakers to busses 141Y(241Y) and 142Y(242Y) from closing on low SAT voltage. ESF Division 3 does not have a SAT winding undervoltage relay.

3. If the SAT winding undervoltage alarm annunciates and a LOCA does not exist, the control room operators will immediately check the voltage on 4160V switchgears 141Y(241Y), 142Y(242Y), and 143 (243). If the bus voltage is verified to be less than 4040 V and the bus is connected to the SAT, the following actions will be taken:

   a. The load dispatcher will be notified to raise the switchyard voltage.

   b. If the Unit is in Run or Startup, any bus with a voltage level less than 4040 V will be declared inoperable and action will be taken as specified in the Technical Specification. The bus can be declared operable when its voltage increases to 4040 V or the Unit is placed in Hot Shutdown, Cold Shutdown, or Refuel.

c. If the Unit is in Hot Shutdown, Cold Shutdown or Refuel, the Unit will not be placed in Startup or Run until the bus voltages are raised above 4040 V. However, the busses are not inoperable under these conditions.

d. No evolutions which will increase bus loading will be performed.

4. If the SAT winding undervoltage alarm annunciates and a LOCA condition exists, the SAT feed breakers to all three ESF 4 kV busses will be tripped. This will cause the busses to de-energize and connect to their associated diesel generator.

B. ESF Divison 3 Motor Control Circuit Voltage Drop Analysis

The preliminary calculations for the ESF Division 3 motor contol circuit voltage drop were prepared by S&L and submitted to CECo for review on December 6, 1991. These calculations were revised to incorporate our comments and finalized on January 15, 1992. The reason for the delay in meeting the above schedule is that not all of the information required to perform these calculations was received from the vendor until December 3, 1991.

The calculations show that the compensatory measures that were implemented in response to the October 2, 1991, letter cover the ESF Division 3 motor control circuits. That is, all ESF Division 3 motor control circuits have adequate voltage to pickup the motor starter contactor at a bus voltage of 4040 volts.

However, the contactors for the following equipment will be field inspected to determine whether nuclear grade or commercial grade models are installed:

1. HPCS Diesel Generator Cooling Water Pump, 1(2)E22-C002
2. HPCS Pump Discharge Valve, 1(2)E22-F004
3. HPCS Diesel Generator Room Vent Fan, 1(2)VD01C
4. HPCS Switchgear Room Exhaust Fan, 1(2)VD07C
5. HPCS Cubicle Cooler Fan, 1(2)VY02C

At a bus voltage of 4040 volts the S&L calculations indicate that the terminal voltages at the coils of these contactors are between 75% and 85% of rated. Vendor documentation for these contactors indicates that the minimum pickup voltage is at least 75% of rated for their nuclear grade models and 85% of rated for their commercial grade models. However, they also indicate that their

commercial grade models have a very high probability (>90%) of being able to pickup at a voltage of 75% of rated.

If the field inspection indicates that a "nuclear grade" model is not installed, a nuclear grade contactor will be procured and installed during the subsequent refueling outage. The Unit 2 contactors for the above equipment will be inspected during the current refueling outage, and the Unit 1 contactors will be inspected during the next refueling outage.

The results of this voltage drop analysis are documented in S&L Calculations 4266/19AZ19 and 4266/19AZ20.

C. Revision of the Preliminary Degraded Voltage Calculations

The scheduled completion date for revising the preliminary degraded voltage calculations has been changed to April 30, 1992. The reason for the delay is that equipment data has not been received from the various motor vendors yet. Letters have been issued to the motor vendors requesting this information but no responses have been received as of this date. The main reason for obtaining this information is that we believe the actual equipment data will show that a lower starting voltage requirement can be utilized in the degraded voltage calculations.

D. Final Action Plan

The schedule for developing the long term action plan for resolving the degraded voltage issue has not been revised. This action plan will identify the design changes and Technical Specification changes that are required for removing the compensatory measures described above and the schedule for completing them. The long term solution for degraded voltage will also address the safety related motor starting voltage issue, Deviation 373/91019-05A(DRS); 374/91019-05A(DRS), and the degraded voltage setpoint methodology issue, Deviation 373/91019- 05D(DRS);374/91019-05D(DRS).

ATTACHMENT D

RESPONSE TO OPEN ITEM
(373/91019-08(DRS); 374-91019-08(DRS))

Battery Sizing Calculation

Description of Condition

The team's review of the battery sizing calculations (4266-19D3) indicated that temperature, design, and aging margins were not applied when sizing the Unit 2, Division 2, 125Vdc battery.

Response

The referenced calculation applies to the original LaSalle FPS-15 cells. Three of those original batteries (Battery 1A 1B and 2A) have already been replaced with NCX-17 cells as part of the LaSalle DC Upgrade project. These new batteries are sized in excess of the requirements of IEEE-485 including all the design margins, even though LaSalle is not committed to IEEE-485 in its design basis.

Calculation 4266-19D3 does apply to the current 2B battery and does not meet the current recommendations in IEEE-485. However, the latest service test indicated that the battery is capable of supplying its design basis loads. A "performance" test to demonstrate the battery's capacity, performed on 4-16-91, indicated that the battery capacity is greater than 105%. In addition, the Electrical Load Monitoring System (ELMS) run using the current load profile independently indicates that the battery has sufficient capacity to meet its design load profile.

The Unit 2, Division 2 battery will be replaced during the unit refueling outage for LaSalle which commenced in early January 1992, at which time calculation 4266-19D3 will cease to apply at LaSalle.

ATTACHMENT D

RESPONSE TO OPEN ITEM
(373/91019-02(DRS);374/91019-02(DRS))

4KV ESF CIRCUIT BREAKER OVERCURRENT PROTECTION

Description of Concern

The team determined that the overcurrent protection relays for the Division 3 4kV ESF feeder breakers were not properly set to clear a fault when powered from the Division 3 EDG. In addition, the licensee could not demonstrate that the overcurrent protection relays for the Division 1 and 2 4kV ESF feeder breakers would not clear a fault when powered from the Division 1 and 2 EDGs. The team determined that the licensee had set the Division 3 relays to protect the 4kV busses and loads from the higher fault currents that would be expected when the busses were supplied by offsite power. In the event of a fault, the failure to isolate Class 1E components from the resulting fault currents could lead to component degradation or failure.

The licensee responded by stating that the consequences of an uncleared fault would be limited to one division. The team concurred with the licensee. However, the team considered this condition to be a design weakness. This item is considered open pending additional licensee analysis (373/91019-02(DRS);374/91019- 02(DRS)).

Response

CECo document RPS-TG-36 requires protective relay settings to be based on both the minimum and maximum available fault currents. However, no industry standards exist that specifically detail the methodology for preparing circuit breaker protective relay settings for busses which are fed from several sources of power. Normal engineering practice is to determine the instantaneous settings from the power source that can supply the greatest fault current because this technique minimizes potential damage to the system. The LaSalle 4kV ESF circuit breaker relay settings were determined with the busses fed from the System Auxiliary Transformer (SAT) which provides the largest source of fault current The design bases for these settings were based upon Sargent and Lundy (S&L) calculations 4266-EAD-4 and 4266-19AN-1.

During the LaSalle EDSFI audit, an analysis was performed by S&L of the existing protective relay settings for the 4 kV LSF circuit breakers. This analysis

concluded that the overcurrent protection relays for the ESF Division 1, 2, and 3 breakers would clear a fault when powered from the associated emergency diesel generator (EDG). This analysis is summarized below.

The LaSalle diesel generators have a subtransient reactance of 6.1% at 3562.5 kVA. Based on this subtransient reactance, the maximum 3-phase fault current from the diesel generator is 8511A. The corresponding line-to-line fault current value is 87% of the 3-phase fault current (1.732/2 x 8511A = 7371A).

Following a LOCA and a loss of offsite power, the only 4 kV loads that are automatically connected to the EDGs are the ECCS pumps and 480 V unit substations.

For ESF Divisions 1 and 2 the maximum instantaneous setting for the 4 kV ECCS pump motors is 3120A for the Low Pressure Core Spray (LPCS) pump motor. Based on fault current decrement curves for a diesel generator that is nearly identical to those installed at LaSalle, the DG fault current output drops to about 73% within 0.01 second (0.6 cycle). This corresponds to a line- to-line fault current value of 5381A (0.73 x 7371A). Since the relay instantaneous units typically operate within half a cycle (0.008 second), bolted (maximum) faults in the ESF Division 1 and 2 ECCS pump motors or their associated cables would be cleared by the motor instantaneous units.

The 480 V unit substations on ESF Divisions 1 and 2 are protected by CO-4 relays with instantaneous units set at 5000A and high drop out instantaneous units set at 800A. As noted in the previous paragraph, the relay instantaneous units typically trip within half a cycle. The high drop out instantaneous units normally trip within 0.6 seconds, and DG fault current decrement curves show that the fault current output drops to 33% at 0.64 seconds. This corresponds to a line-to-line fault current value of 2432A (0.33 x 7371A). Therefore, bolted faults in these loads would also be cleared by either the instantaneous units or high drop out instantaneous units in the unit substation phase overcurrent relays.

ESF Division 3 has only two 4 kV feeder circuit breakers - the HPCS pump motor and the 480 V unit substation. A similar analysis of the protective relay settings for these two breakers also shows that faults in these loads would be cleared when powered from the the EDG.

This justification concludes that faults on feeders will be cleared if the ESF buses are fed from the diesel generators. Not withstanding this conclusion which is based on technically defensible engineering judgement, it is our position that a fault in the safety related distribution system constitutes a single failure that may,

depending upon its location, magnitude, configuration, etc., render the entire division inoperable whether or not the protective devices are able to isolate and disconnect the faulted component. This is especially true for ESF Division 3 which has only two 4 KV feeder circuit breakers. Should either of these breakers trip due to a fault, the entire division would become inoperable. However, the plant is designed for a single failure. Therefore, CECo believes that no further actions are warranted at this time.