BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of :

Docket No. 50-387

PENNSYLVANIA POWER & :
LIGHT COMPANY

PROPOSED AMENDMENT No. 185
FACILITY OPERATING LICENSE NO. NPF-14
SUSQUEHANNA STEAM ELECTRIC STATION
UNIT NO. 1

Licensee, Pennsylvania Power & Light Company, hereby files proposed Amendment No. 185 to its Facility Operating License No. NPF-14 dated July 17, 1982.

This amendment contains a revision to the Susquehanna SES Unit 1 Technical Specifications.

PENNSYLVANIA POWER & LIGHT COMPANY
BY:

R. G. Byram
Sr. Vice President - Nuclear

Sworn to and subscribed before me
this 31st of March, 1995.

Notary Public

Notarial Seal
Martha C. Sedora, Notary Public
Allentown, Lehigh County
My Commission Expires Jan. 15, 1998
Member, Pennsylvania Association of Notaries

BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of :

Docket No. 50-388

PENNSYLVANIA POWER & :
LIGHT COMPANY

PROPOSED AMENDMENT No. 141
FACILITY OPERATING LICENSE NO. NPF-22
SUSQUEHANNA STEAM ELECTRIC STATION
UNIT NO. 2

Licensee, Pennsylvania Power & Light Company, hereby files proposed Amendment No. 141 to its Facility Operating License No. NPF-22 dated March 23, 1984.

This amendment contains a revision to the Susquehanna SES Unit 2 Technical Specifications.

PENNSYLVANIA POWER & LIGHT COMPANY
BY:

R. G. Byram
Sr. Vice President - Nuclear

Sworn to and subscribed before me
this 31st of March, 1995.

Notary Public
Notarial Seal
Martha C. Sedora, Notary Public
Allentown, Lehigh County
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Member, Pennsylvania Association of Notaries

SAFETY ASSESSMENT

24 HOUR EMERGENCY DIESEL GENERATOR TESTING

Background

The SSES Technical Specifications require OPERABILITY be demonstrated at least once every 18 months by verifying with at least one unit in OPERATIONAL CONDITION 4 or 5 that the diesel generator operates for at least 24 hours. This requirement was originally incorporated in 1986 to address concerns of NRC Information Notice (IN) 84-69. The IN encourages minimizing the time Emergency Diesel Generators (EDGs) are paralleled with the off-site Alternating Current (AC) power supply because of the possibility that some fault on the off-site system could cause lockout of the Engineered Safety System (ESS) bus on which the EDG is paralleled, or trip of the EDG itself. In such cases the ability to respond to emergencies is reduced because of the "loss" (at least temporarily) of the paralleled EDG. PP&L responded to this concern by restricting the longest anticipated EDG test (24 hours) to those times in which at least one SSES unit is in CONDITION 4 or 5 (cold shutdown or refueling). However, additional analysis of the Susquehanna SES electrical power system configuration has determined that the loss of an in-test EDG is prevented by EDG design.

Description of Changes

It is proposed to delete the OPERATIONAL CONDITION restriction in S.R. 4.8.1.1.2.d.7 requiring the 24 hour EDG testing be performed with one unit in OPERATION CONDITION 4 or 5. This proposed change is specific to EDGs "A", "B", "C" and "D" only. The 24 hour test run of EDG "E" is not subject to the requirement that one unit be in CONDITION 4 or 5 due to its having an independent test bus.

Safety Analysis

Analysis

The design response of the paralleled EDG was reviewed in response to Loss of Offsite Power (LOOP), Loss of Coolant Accident (LOCA), and LOCA with LOOP. While this discussion is specific to EDG "A", it is true for the other EDGs because of equipment similarity. Central to the discussion is the fact that SSES design will prevent loss of the in-test EDG on LOOP.

LOOP

If EDG "A" is paralleled to the off-site supply and LOOP occurs, the following worst case timing scenario is expected:

1. Off-site power fails and voltage collapses.

2. EDG "A" trips on over-excitation after a 10 second time delay, causing trip of EDG output breaker 52-20104 and isolating EDG "A" from 4.16 Kv ESS bus. EDG "A" begins to coast down. Because the over-excitation test trip of the EDG is coordinated with the thermal damage threshold of the field winding, the test trip protects the field winding and, by extension, the exciter.

3. ESS bus under voltage isolates ESS buses 1A201 and 2A201 from off-site sources (i.e. feeder breakers trip).

4. Opening of all three breakers (two off-site feeds and EDG output) followed by a 0.5 sec. time delay is an emergency start signal to the test EDG which automatically bypasses test trips. If EDG "A" has not coasted down appreciably (i.e. if rpm $\geq$ 280) EDG accelerates on fuel only. If speed is less than 280 rpm, EDG "A" accelerates on fuel assisted by starting air.

5. When EDG speed > 540 rpm, breaker 52-20104 closes, energizing ESS bus.

6. The response of the other three EDGs not in test is similar with the exception that the opening of the EDG output breaker is not required prior to the emergency start signal.

In the case of LOOP without LOCA note that the LOOP signal is an emergency start for all EDGs. If one EDG is paralleled to the grid prior to the LOOP, the emergency start signal bypasses the test trips, and the EDG is capable of supplying the ESS buses automatically without operator action. Note that the EDG in test is <u>not</u> failed by the LOOP. However, because the field overcurrent relay must time out prior to the bus voltage collapse, EDG loading for the test diesel is delayed about 10 seconds. This timing is "worst case" because actual bus voltage during a LOOP is expected to be less than 65%. At less than 65% the ESS bus is isolated in three seconds on bus undervoltage.

For LOOP, a ten second EDG loading delay is acceptable because no AC power is required to cope with the plant transient within this time frame. HPCI/RCIC are available for both units to provide vessel injection. Line up of RHR for containment heat removal is a manual action performed by design after ten minutes into any plant event. Again, the plant is capable of surviving total Station Blackout (SBO) for four hours. The ten second delay has no impact on plant response for LOOP.

The ESS buses themselves are protected from overcurrent (faulted) conditions by breaker logic which causes bus lockouts. If a lockout occurs, operator action is required to reset the lockout prior to EDG loading. However, no bus lockouts are expected due to LOOP with an EDG in test. Of concern here is bus lockout due to activation of the time-overcurrent logic associated with the EDG feeder breaker. To activate, ESS bus voltage must remain greater than 65% but less than 67.3% for 10 seconds with a current flow through the breaker of 2970 amps or greater. If bus voltage remains greater than 67.3% the bus fault logic is bypassed and the test EDG trips on exciter overcurrent at 10 seconds. If the bus voltage drops below 65% the bus undervoltage logic actuates to isolate the bus at 3 seconds, avoiding the lockout. Thus, to be of concern the bus voltage must remain within a very narrow band with a high current flow for a relatively long time (10 seconds). For LOOP, i.e. a complete loss of the paralleled supply, current flow does approximate that of the 3Φ fault under balanced conditions. However, LOOP results in bus voltage less than 65%, and with voltage at this level the three second undervoltage logic isolates the ESS bus prior to the time-overcurrent protection. Again, LOOP with an EDG paralleled with the off-site source does not result in ESS bus lockout and no operator action is required for EDG loading of the bus.

The above holds for partial LOOP also. That is, if the supply in parallel with the EDG is lost, the EDG in test will unload as described above and remain operating. The off-site supply remaining will feed the ESS bus. If the non-paralleled supply is lost but the paralleled supply is not, the off-site source to which the EDG is paralleled supplies all ESS buses.

LOCA without LOOP

In this situation off-site power remains available. The LOCA signals (high drywell pressure or low-low-low reactor vessel water level) cause an emergency start of the EDG, again tripping output breaker 52-20104. This signal has no timing delay built into it, that is, unlike LOOP, the LOCA signal is an immediate start signal to the EDG. The EDG isolates from the ESS bus but continues to run. Off-site power supplies ESS buses and LOCA loads. As with the LOOP-only scenario, the test EDG remains available to supply ESS buses, the other three non-test EDGs receive start signals from the LOCA and also remain running and ready to supply LOCA loads. The plant response is the same as if no 24 hour test is in progress.

LOCA with LOOP

The DBA loss of coolant accident for SSES is a simultaneous LOCA/LOOP. In this event the following scenario is expected:

1. LOCA signals of high drywell pressure or low-low-low vessel water level cause the output breaker (52-20104) to trip, isolating the EDG from the ESS bus. The EDG continues to run.

2. ESS bus under voltage trips both off-site feeder breakers open, isolating off-site sources.

3. Isolated ESS bus allows closing of EDG output breaker onto the bus.

The LOCA signals also cause emergency start of the non-test EDGs. Steps 2 and 3 above are identical. Again, the accident sequence is not expected to cause failure of the test EDG. Automatic loading of the test EDG is retained within the 10 second design window. In fact, because the test EDG is already up and running, loading of the EDG is actually improved by 8.5 seconds.

In addition, a risk determination of operating in this test mode was completed and supports the decision to remove this operational condition restriction. This analysis conservatively assumed the loss of the test EDG occurs as part of the initiating event (LOOP or LOCA/LOOP). However, as discussed above, loss of the test EDG has been demonstrated to be prevented during the initiating event. The risk profile of SSES remains unchanged, that is, risk from Station Blackout (SBO) dominates risk from LOCA with LOOP. Further, SSES has equipment and procedures in place for coping with SBO for extended periods of time. (Equipment and procedures are also sufficient for coping with LOCA/LOOP with two EDGs inoperable for several days.)

Conclusion

The ability of each EDG to survive a load reject without tripping is verified every 18 months. The impact on EDG speed in response to load reject is similar to that of the EDG during LOOP when paralleled to the grid because of the grid voltage collapse during the LOOP. No damage to the EDG is experienced during the load reject test. As previously discussed, there is no field or exciter damage. Based on SSES experience there is no reason to believe that a trip of the EDG during the test run causes damage such that subsequent emergency start is prevented. Further, LOOP should not cause EDG trip on overspeed, an emergency trip requiring manual reset before EDG restart. Because the response of the test EDG is essentially identical to that of the non-test EDGs, the plant continues to satisfy the single failure criteria and remains within the design basis during the 24 hour EDG test.

NO SIGNIFICANT HAZARDS CONSIDERATIONS

The proposed changes do not:

I. Involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed change to permit the 24 hour testing of the emergency diesel generators during power operation does not increase the chances for a previously analyzed accident to occur. The function of the EDGs is to supply emergency power in the event of a loss of offsite power. As stated above the diesel generator being tested has been determined to remain operable and available to supply the emergency loads within the required times. In addition, the three remaining EDGs will be operable during this test. Operations of an EDGs is not a precursor to any accident. If, however, an offsite disturbance were to occur that affected the operability of the DG being tested, the remaining EDGs are capable of feeding the loads necessary for safe shutdown of the plant. In summary, the proposed change does not adversely affect the performance or the ability of the diesel generators to perform their intended safety function. Therefore, the proposed change will not involve a significant increase in the probability or consequences of an accident previously evaluated.

II. Create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed change to the 24 hour surveillance requirement will not affect the operation of any safety system or alter its response to any previously evaluated accident. The diesel generator will automatically transfer from test mode if necessary to supply emergency loads in the required time. The test mode is used for the monthly surveillances of these diesel generators, resulting in no new plant operating modes being introduced. In the event the EDG fails the functional test it will be declared inoperable and the actions required for an inoperable diesel will be performed. The remaining three EDGs will be operable and are capable of feeding the loads necessary for safe shutdown of the plant. Therefore, the incorporation of this change will not create the possibility of a new or different kind of accident from any accident previously evaluated.

III. Involve a significant reduction in a margin of safety.

Changing the EDG test timing results is no reduction in the safety margin as defined in the design basis. Because loss of an EDG is not expected as a result of LOOP or LOCA/LOOP during the 24 hour test, SSES remains within its design basis. In fact, because the test EDG loads the ESS bus 8.5 seconds earlier than the non-test EDGs during LOCA with LOOP, plant response is actually improved. Risk of operation during the 24 hour EDG test is certainly less than during the current 84 hour allowed outage time

(AOT) because both the impact of the initiating events evaluated (EDG in test is not actually failed) and the frequency of the limiting plant condition (loss of two EDGs) are less. No increase in frequency or impact of design basis events, and no reduction in the safety margin occurs during the 24 hour EDG test. Therefore, the incorporation of this change will have no impact on current safety margins, nor will it involve a significant reduction in the margin to safety.

ENVIRONMENTAL CONSEQUENCES

This request is consistent with the Susquehanna design basis, in that the response of the test EDG is essentially identical to that of the non-test EDGs, the plant continues to satisfy the single failure criteria during the 24 hour EDG test. Therefore, no environmental consequences that have not been previously considered are anticipated.

IMPLEMENTATION

PP&L would like to incorporate the proposed change into work planning for the Unit 2 pre-outage work, and asks that the NRC complete its review no later than August 9, 1995.