



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20556-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 96 TO FACILITY OPERATING LICENSE NO. NPF-11 AND
AMENDMENT NO. 80 TO FACILITY OPERATING LICENSE NO. NPF-18
COMMONWEALTH EDISON COMPANY
LASALLE COUNTY STATION, UNITS 1 AND 2
DOCKET NOS. 50-373 AND 50-374

1.0 INTRODUCTION

By letter dated October 28, 1993 (Ref. 1) as supplemented January 21, 1994, Commonwealth Edison Company (CECo, the licensee) requested a change to the LaSalle County Station, Units 1 and 2 (LaSalle) Technical Specifications (TS). The proposed changes revise the Emergency Core Cooling System (ECCS) injection valve stroke times and ECCS response times. These changes are necessary due to Motor-Operated Valve (MOV) modifications (resulting from Generic Letter (GL) 89-10 testing) that would increase ECCS injection valve stroke times.

As part of the submittal, the licensee updated the LaSalle SAFER/GESTR-LOCA analysis using the slower ECCS response times and verified that the limiting Loss-Of-Coolant Accident (LOCA) results in a Peak Cladding Temperature (PCT) less than 2200 °F. The results of this analysis were included with the application in a GE topical report (Ref. 2). In addition, a review of the sensitivity of previous analyses was performed for Anticipated Transients Without Scram (ATWS), containment response, the limiting offsite dose event (Main Steamline Break outside containment), and HPCS-related transients.

The January 21, 1994, supplemental letter requested changes to the Units 1 and 2 Bases sections. These changes are editorial in nature and do not change the original no significant hazards consideration determination.

2.0 EVALUATION

The ECCS includes the Low Pressure Core Spray (LPCS), the Low Pressure Coolant Injection (LPCI), and High Pressure Core Spray (HPCS) systems. These systems are designed primarily to mitigate the effects of a LOCA and, to a lesser extent, the effects of several other events. Response times and injection valve stroke times are used as input assumptions in the LaSalle design basis analyses. The current TS required response times were the values used by General Electric (GE) and it was demonstrated that the limiting LOCA results in a PCT of 1138 °F, which is less than the acceptance limit of 2200 °F. The current response times for LPCS and LPCI are given as less than or equal to 40 seconds. The current response time for the HPCS is given as 27 seconds. The injections valves for LPCS and LPCI are required to be open within 20 seconds

after receipt of the reactor vessel pressure and ECCS injection line pressure interlock signal concurrently with power source availability and receipt of an accident initiation signal.

Because the injection valves are MOVs, the response times are dependent on the valve stroke times. GL 89-10, "Safety Related Motor-Operated Valve Testing and Surveillance," requested licensees to test and evaluate long standing problems with MOVs. After a review of data from this testing, CECO decided to modify the ECCS injection valves by changing actuator gearing to improve thrust margins. The planned gear changes result in longer stroke times than currently limited by the LaSalle TS. The proposed valve stroke time limits for the LPCS and LPCI would be increased from within 20 to within 40 seconds, and this results in increasing the required response time from less than or equal to 40 seconds, to less than or equal to 60 seconds. Because the HPCS injection valve stroke time increases from 14 seconds to 28 seconds with the modification, the response time for this system is proposed to be changed from less than or equal to 27 seconds to less than or equal to 41 seconds.

The increased valve stroke times will result in a delay in coolant injection during a LOCA and therefore the PCT will subsequently increase. To demonstrate that the increased stroke times do not result in a PCT exceeding the allowable limit, and to verify that the other four LOCA licensing criteria in 10 CFR 50.46 continue to be met, a limited break spectrum LOCA analysis was performed using the increased injection response times for LPCS, LPCI, and HPCS as input assumptions. The SAFER/GESTR-LOCA methodology was previously adopted and approved for use by LaSalle Units 1 and 2 in NRC Safety Evaluation Reports dated June, 1988 and January, 1989 (Refs. 3 & 4). The results of the updated LOCA analysis were submitted with the application (Ref. 2) and were evaluated by the staff as part of the TS amendment.

Requirements for the use of SAFER/GESTR-LOCA were established in the Topical Report Evaluation contained in Reference 5. The methodology includes the stipulation that a sufficient number of plant specific PCT points based on both nominal input values and Appendix K values are calculated so that the shape of the PCT versus break size can be verified. The conditions for demonstrating applicability of the SAFER/GESTR-LOCA analysis to a particular plant also includes confirming that plant specific operating parameters have been bounded by the models and inputs used in the generic calculations and confirming that the plant specific ECCS configuration is consistent with the referenced plant class ECCS configuration. The plant operating conditions and model inputs have been reviewed and found to be bounding and/or consistent with the generic analysis of Reference 6 and therefore, the licensee meets the latter two criteria for acceptability. The applicability of the PCT values will be discussed in the following paragraphs.

The nominal PCT (PCT_{NOM}) curve is determined using best estimate values of plant response and a representative number of break sizes. The analysis included break sizes ranging from 0.05 ft² to the design basis accident (DBA) recirculation suction line break (3.10 ft²). The curve generated is used to determine the limiting LOCA (highest PCT) which is then used for subsequent

calculations. Another curve is generated using the Appendix K conservative assumptions and resultant PCT_{APPK} values. A Licensing Basis PCT (PCT_{LIC}) is determined from the limiting PCT_{NOM} , PCT_{APPK} , and plant uncertainty terms. The limiting PCT_{NOM} must also pass another criterion for its statistical upper bound value to be less than the PCT_{LIC} . The Upper Bound PCT (PCT_{UB}) is a function of the limiting PCT_{NOM} , modeling bias, and plant variable uncertainty. The analysis presented in the generic report uses assumptions arising from conditions based on the large break event. The requirements of the Topical Report Evaluation ensure that specific plant LOCA response does not significantly diverge from the generic LOCA response and possibly invalidate application of SAFER/GESTR-LOCA analysis.

The ECCS configuration for LaSalle (3 LPCI, LPCS, HPCS, and Automatic Depressurization System (ADS)) is consistent with the generic configuration for the BWR-5/6 plant in Reference 6. Results of break calculations presented in the LaSalle PCT versus break size plot in Figure 5-1 of Reference 2 are consistent with the curves in Figure 3-4 in Reference 6. The limiting break for the nominal and Appendix K studies was found to be the DBA recirculation suction line break coincident with HPCS Diesel Generator (D/G) failure. For all fuel types, the PCT_{LIC} are below the 10 CFR 50.46 requirement of 2200 °F and the PCT_{UB} are less than the respective PCT_{LIC} . For the limiting P8x8R (GE7) fuel type, the licensing basis PCT_{LIC} was calculated to be 1260 °F. In all cases the PCT_{UB} is below the 1600 °F limit set by the bases of the SAFER/GESTR-LOCA analysis. Conformance with the other 10 CFR 50.46 criteria for maximum local oxidation and hydrogen generation was also demonstrated by the analysis in Reference 2. PCT results were obtained for several GE fuel types up to the GE8x8NB (GE9) type. Because the accident analyses have been performed using approved methods, and the results meet the staff's acceptance criteria, we conclude that these analyses are acceptable and the results may be used to provide an updated LOCA licensing basis for LaSalle Units 1 and 2.

The ECCS performance for LaSalle under Single Loop Operation (SLO) was also evaluated using SAFER/GESTR-LOCA methods for the limiting DBA with HPCS D/G failure. Without a Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) reduction, these bounding calculations result in PCT_{NOM} and PCT_{APPK} values higher than the two loop operation case; however, they remain well below the 10 CFR 50.46 and analysis basis limits. Because sufficient margin to the 10 CFR 50.46 limits exists while using conservative analysis assumptions for SLO, no MAPLHGR reduction factors are required for LaSalle.

The MAPLHGR is not expected to be limited by LOCA/ECCS considerations. The bounding MAPLHGR's used in the Reference 2 analysis were higher than the expected thermal-mechanical MAPLHGRs; therefore, the MAPLHGR limits currently used in the LaSalle Core Operating Limits Report (COLR) remain valid. As with the previous LaSalle LOCA analysis, the new LOCA analysis is also valid for operation in the Extended Load Line Limit Analysis (ELLLA) region. The effects of core flow less than rated on the ECCS analysis results were addressed generically by the NRC in an earlier Safety Evaluation Report (Ref. 7) and it was concluded that MAPLHGR multipliers as a function of core flow are not required due to LOCA considerations.

Sensitivity studies were also performed to evaluate the effects that the slower ECCS injection response time would have on ATWS, containment, offsite dose (Main Steamline Break outside containment), and HPCS-related events. The results demonstrated that the events are not impacted by the increased injection valve stroke times.

In summary, the licensee demonstrated conformance to 10 CFR 50.46 and Appendix K with the submitted LOCA analysis using the revised slower ECCS response times and based on the review described above, the updated SAFER/GESTR-LOCA analysis is found to be acceptable and results may be used to provide an updated LOCA licensing basis for LaSalle Units 1 and 2.

3.0 TECHNICAL SPECIFICATIONS

The proposed changes to the LaSalle Units 1 and 2 ECCS response times in the TS are as follows:

- a. Table 3.3.3-3, Item 1 - Increase response time for LPCS from ≤ 40 seconds to ≤ 60 seconds.
- b. Table 3.3.3-3, Item 2 - Increase response time for LPCI from ≤ 40 seconds to ≤ 60 seconds.
- c. Table 3.3.3-3, Item 4 - Increase response time for HPCS from ≤ 27 seconds to ≤ 41 seconds.
- d. Table 3.3.3-3, Footnote - Increase stroke time for LPCS and LPCI injection valves from within 20 seconds to within 40 seconds.

Based upon the acceptance of the methods and results of the SAFER/GESTR-LOCA analysis using the slower ECCS response times in Section 2 of this evaluation, these TS changes are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (59 FR 4937). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement

or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

Commonwealth Edison requested changes to the LaSalle County Nuclear Power Station Units 1 and 2 Technical Specifications. The changes revise the ECCS injection valve stroke times and ECCS response times due to MOV modifications that slow down the injection valve stroke times. The application included an update to the SAFER/GESTR-LOCA analysis for the LaSalle plants to justify operation with the slower ECCS injection response. Upon review of the application and the proposed Technical Specification amendment, the staff concludes that plant safety is not adversely affected by the changes and that they are acceptable.

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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