



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 92 TO FACILITY OPERATING LICENSE NO. NPF-11 AND
AMENDMENT NO. 76 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

The Commonwealth Edison Company (CECo, the licensee) proposed for the LaSalle County Station, Units 1 and 2 in its letter dated October 29, 1993, a plan for complying with NRC Bulletin 93-03 (Bulletin), "Resolution of Issues Related to Reactor Vessel Water Level Instrumentation in BWRs." In this submittal, the licensee proposed to use the Control Rod Drive (CRD) system as a source of water to be injected into the six reactor vessel water level reference legs. The purpose of the proposed injection lines (i.e., the backfill lines) is to provide a source of water for all six subject reference legs to maintain the water in these legs free of dissolved non-condensable gases.

The licensee first proposed its detailed design for the subject backfill lines in its letter dated October 8, 1993, in which the proposed modification was identified as an unreviewed safety question (USQ). In another letter dated October 18, 1993, the licensee proposed amendments to Facility Operating Licenses NPF-11 and NPF-18 for the LaSalle Station, Units 1 and 2. The thrust of the proposed amendments was an administrative change which would add eight valves to the list of Primary Containment Isolation Valves, Table 3.6.3-1, of the LaSalle County Station Technical Specifications (TS). These valves were added as containment isolation devices in the backfill system previously cited. Finally, the licensee made its third submittal on this matter on October 29, 1993, in which it continued to propose the same hardware modifications as in its previous submittals, but requested that the proposed license amendments be treated as exigent in accordance with 10 CFR 50.91(a)(6). The licensee stated that this latest letter superseded the prior two submittals in their entirety. Accordingly, the licensee's submittal dated October 29, 1993, is the only document reviewed.

The licensee supplemented its explanation of the circumstances leading to the need for exigent treatment for the license amendments in its letter dated November 15, 1993. However, due to an unanticipated problems with various hardware components, restart will be delayed until about December 11, 1993. Accordingly, these license amendments will not be treated as exigent; this Safety Evaluation addresses only the licensee's response to the Bulletin and the proposed TS revision.

2.0 DISCUSSION

The Bulletin was issued on May 28, 1993, to notify all holders of operating licenses or construction permits for boiling water reactors (BWRs) except for Millstone, Unit 1, and Big Rock Point, about new information concerning reactor vessel water level indication errors which may occur during plant depressurization. The basic safety issue addressed in the Bulletin arises from the concern that noncondensable gases may become dissolved in the reference legs of the BWR reactor vessel level instrumentation systems (RVLIS) during normal operation and later lead to a false high water level indication either after a rapid depressurization event or during a slow depressurization. The Bulletin requested that affected licensees take certain actions, including short-term compensatory actions and hardware modifications to ensure that the level instrumentation system is of high functional reliability for long-term operation. Licensees were also required by the Bulletin to report if the requested actions would be taken. The Bulletin requested that the hardware modifications be implemented prior to start up from the next cold shutdown occurring after July 30, 1993.

The proposal submitted by the licensee on October 29, 1993, addresses Item 2, "Hardware Modifications," of the Bulletin to ensure that the RVLIS design is of high functional reliability for long-term operation.

The licensee's design for the LaSalle backfill system proposes injecting water from the control rod drive (CRD) system on a continuous basis into the RVLIS reference legs at either one of two points depending upon whether the reference legs provide emergency core cooling system (ECCS) actuation signals or level indication only. The first design consists of four backfill lines which inject into their RVLIS reference legs inboard of their associated containment isolation valve and the manual root valve. The terms inboard and outboard as used in this evaluation refers to the injection point relative to the root valve as shown on Figure 1 of the October 29, 1993, submittal. Both injection points, however, are outside primary containment. These four subject reference legs are those which provide both a pressure and level input to their respective instrument racks, which in turn provide actuation signals for the engineered safety features (ESF) of the LaSalle County Station. These ESF functions include opening of the safety relief valves (SRV) on the main steamlines through their pressure switches as well as the permissive controlling opening of the low pressure ECCS injection valves.

One of the effects of the proposed addition of the backfill lines which inject inboard of the root valve is to extend the containment pressure boundary out through the safety-related backfill lines to the containment isolation devices separating the backfill lines from the nonsafety-related CRD system. The licensee has proposed installing two check valves in series in each of these four subject backfill lines as the containment isolation devices required by General Design Criterion (GDC) 55 of Appendix A to 10 CFR Part 50. GDC 55 prescribes four specific containment isolation valve arrangements for lines penetrating containment but also allows for alternate containment isolation approaches. Since the licensee's present proposal does not conform with any

of the four valve arrangements prescribed in GDC 55, the licensee has proposed an alternative compliance as provided for in GDC 55.

The disadvantage of extending the containment pressure boundary out to the two subject check valves in each of the four reference legs which provide ESF actuation signals is offset by eliminating the possibility of inadvertently isolating the instrument racks from the reactor pressure vessel by closing the manual root valve, thereby potentially subjecting these instruments to the CRD system pressure of 1300 psi. Either the inadvertent closure or blockage of a root valve while a reactor is operational (i.e., in Modes 1, 2, or 3) could result in a severe transient at the LaSalle County Station as shown in Attachment F of the licensee's letter dated October 29, 1993.

Because the check valves become part of the containment pressure boundary, the licensee proposes to amend the licenses for Units 1 and 2 of the LaSalle County Station to add the eight check valves to Table 3.6.3-1 of the station's TSs.

The other two backfill lines will inject into their associated RVLIS reference legs outboard of the root valve and containment isolation valve. These latter two RVLIS reference legs provide a level input to instruments which do not initiate actuation signals. No additional containment isolation valves are required.

3.0 EVALUATION

3.1 Technical Specification Change

The staff has reviewed the licensee's proposed amendment of the LaSalle Station's operating licenses and has found the addition of the eight subject check valves in four of the RVLIS reference legs to Table 3.6.3-1 of the LaSalle TS to be administrative in nature with one exception. While the addition of the valves into the TSs is fundamentally administrative, the physical addition of the subject check valves into the station raises a potential safety question. This question arises since the proposed use of two check valves in series in each of the four subject backfill lines does not explicitly comply with any of the four prescriptive containment isolation valve arrangements specified in GDC 55. However, the licensee has proposed design criteria and a design configuration which meets the intent of GDC 55 in that it has "... demonstrated that the containment isolation provisions ... are acceptable on some other defined basis ..." as allowed in part by GDC 55. This proposed compliance is evaluated in the following section.

3.2 Compliance with GDC 55

The licensee's defined basis, as required by GDC 55, for the acceptability of the two subject check valves separating the safety-related portion of the backfill lines from the nonsafety-related CRD system is contained in Attachment B of its letter dated October 29, 1993. In this attachment, the licensee lists thirteen separate items which serve as its defined basis. Of

these, eight of the thirteen listed items bear directly on safety provisions which comply with the intent of GDC 55; i.e., to minimize leakage from the primary containment under normal and accident conditions. The staff finds that these eight items provide reasonable assurance that any leakage from the primary containment attributable to the addition of the backfill lines injecting inboard of the root valve into the four subject reference legs that initiate actuations will be minimal and that the addition of the two check valves in series is acceptable. The more significant features which form the basis for the staff's finding on this matter are listed below.

- a. There is an existing 1/4-inch orifice on each reference leg inside primary containment which will continue to limit any reactor coolant leakage or discharge under faulted conditions to values previously found acceptable for the present RVLIS configuration.
- b. The backfill piping and its support will be seismically qualified and built to the appropriate ASME standards. These are the same standards and qualifications as the present RVLIS design.
- c. The licensee states that the backfill local flow instrument racks are located as close as practical to the primary containment; i.e., three of the four piping runs range between eight to eighteen feet. One of the four piping runs is 54 feet long so as to avoid a relatively high radiation zone of several hundred millirem per hour. This is consistent with the requirements of 10 CFR Part 20.
- d. The backfill piping installation meets the physical separation criterion in that the closest approach between any two of the instrumentation racks and their associated backfill lines is about 30 feet.
- e. Potential offsite exposures at the LaSalle Station's exclusion boundary due to a single postulated failure of a backfill line would be well below the guideline limits in 10 CFR Part 100 since the potential offsite doses are enveloped by an instrument line break.

We find that check valves are appropriate for use in the backfill system as containment isolation devices rather than power-operated valves because the opening and closing of these latter devices would cause pressure spikes in these small lines that could affect downstream instruments thereby causing undesirable actuations, reactor trips and alarms.

Finally, inclusion of all eight subject check valves in Table 3.6.3-1 of the Unit 1 and Unit 2 TS requires that these valves be subject to Type C testing in accordance with Apperfix J to 10 CFR Part 50.

The licensee also includes in its list of thirteen items cited above, four features of the subject backfill lines which ensure the proper functioning of the RVLIS systems over and above the continuous supply of water into the reference legs. These are:

- f. The two subject check valves in each of the four actuation reference legs will be tested with water to a restrictive leak rate criterion of 3.8 cc per hour. This value was selected to ensure that any error in the affected reference legs due to leakage through the subject check valves would not significantly affect the RVLIS integrity. This potential leakage from the subject reference lines could result from either a pipe break in the nonsafety-related CRD piping or a loss of the CRD system pressure.
- g. The location of the backfill line connection to the four subject RVLIS reference legs will not affect the response time of the associated instrumentation.
- h. The backfill lines will not close accidentally during normal reactor operation since the CRD system pressure will ensure that the water flow will keep the subject check valves open. Additionally, the CRD water flow into the backfill lines will be checked daily on operator rounds.
- i. In the event that the subject check valves were to close, the backfill lines will reopen as required since the operating CRD system pressure of 1300 psi is greater than the reactor pressure under all circumstances. Moreover, if the CRD pump is not operating, the subject check valves in the backfill lines will remain closed and be relatively leak tight as discussed in Item (f) above.

The staff finds these design features to be acceptable.

In its submittal, the licensee has also provided numerical values of the leakage flow rates associated with potential pipe breaks at three separate points in the proposed design configuration as shown in Figure 1 of the October 29, 1993, submittal. Based on a review of the predicted flow rates calculated in the licensee's conservative analysis, the staff agrees with the licensee's conclusion that a single failure consisting of a potential line break in the nonsafety-related CRD system would result in a leakage rate far below that previously found acceptable for the present RVLIS design configuration. Consequently, the staff finds that the proposed addition of the four subject backfill lines and their associated check valves will not increase potential primary containment leakage or discharge under faulted conditions and, therefore, is in compliance with 10 CFR Part 100 as discussed in Item (e) above.

In summary, the staff finds that the proposed addition of the four subject backfill lines and their associated check valves have a defined basis which ensures that the intent of GDC 55 is met and, therefore, is in compliance with its requirements. We also find that the licensee's proposal is in compliance with 10 CFR Part 20, GDC 55 of Appendix A to 10 CFR Part 50, Appendix J to 10 CFR Part 50, and 10 CFR Part 100 as discussed above.

3.3 Compliance with NRC Bulletin 93-03

Region III will inspect the backfill system including such aspects as the applicable quality assurance program in accordance with a forthcoming Temporary Instruction (TI) module, after implementation of the hardware modifications.

3.4 Backfill Lines Connected to Non-Actuating Instruments

As discussed above, there are two backfill lines which will inject water into their associated reference legs of RVLIS outboard of their root valves and containment isolation valves. In the event of an inadvertent closure of one of these root valves, the associated instruments will indicate a false high reactor pressure and an unreliable reactor vessel water level. This effect arises from the isolation of the associated instrument rack from the reactor pressure vessel, thereby subjecting these instruments to the CRD system pressure which would quickly raise the pressure level at the instruments to 1300 psi. An immediate alarm will sound in the control room, thereby alerting the reactor operators to the event. No automatic ESF actuation will be either initiated or defeated. The operators, alerted to this event, can readily determine by comparison with other reliable reactor vessel water level indications and pressure readings that the alarm is spurious and that the false readings are also spurious. The cause of the event would, therefore, be readily diagnosed and quickly corrected.

The licensee states that the expenditure of resources required to inject water inboard of the root valves for the two indication only reference legs is not justified on the basis of the low probability of the event and its relatively minor consequences. The staff finds that this position is acceptable.

With respect to the issue of connecting the nonsafety-related CRD system to the safety-related RVLIS system, these two reference legs which provide level indications only are also separated from the CRD system by two check valves in series as shown in Figure 1 of the October 29, 1993, submittal. The staff finds that the use of two safety grade check valves in series forming the boundary between the backfill system and the nonsafety-related CRD system is acceptable.

4.0 NEED FOR EXPEDITED ACTION

The Bulletin requests in part that if a facility is in cold shutdown after July 30, 1993, the affected licensee implement, prior to restart, the hardware modifications necessary to ensure that the RVLIS design is of high functional reliability for long-term operation. CECO committed by letter dated September 3, 1993, to install modifications in Unit 2 prior to start up after the refueling outage starting in September 1993. In its letter dated September 15, 1993, the licensee committed to install the RVLIS modifications in Unit 1 at the next refueling outage or during the first cold shutdown after December 1, 1993. LaSalle Station, Unit 2, began its fifth refueling outage on September 4, 1993. In order to meet its commitment for Unit 2, the

licensee will implement the hardware modifications cited above prior to restart. The licensee submitted its proposed hardware modifications in the series of letters previously cited.

The licensee requested in its letter dated October 29, 1993, that its proposed amendments be treated as exigent and stated that it needed these amendments by November 24, 1993. Accordingly, the staff published an Individual Notice in the Federal Register (58 FR 59493) on November 9, 1993, of proposed action for amendments on an exigent basis for which it had made a proposed determination that no significant hazards consideration was involved. This would have permitted the staff to issue the requested license amendments on November 24, 1993, after a 15-day comment period, in accordance with 10 CFR 50.91(a)(6).

Subsequently, the staff was informed in a series of telephone calls that unforeseen and unanticipated problems with certain hardware components would delay restart of Unit 2 by over two weeks past the licensee's prior restart estimate of November 24, 1993. The licensee then stated in a telephone conversation on December 2, 1993, that its best estimate for Unit 2 restart was December 11, 1993. Accordingly, the staff concluded that the requested license amendments need not be treated as exigent. On this basis, the staff decided to issue the license amendments no earlier than December 10, 1993, thereby providing a 30-day comment period for the staff's proposed no significant hazards consideration determination.

5.0 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.

6.0 ENVIRONMENTAL CONSIDERATION

This amendment involves changes in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment involves 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets 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 this amendment.

7.0 CONCLUSION

We have 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 this amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Dated: December 10, 1993