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Downers Grove, IL 60515-5701

January 18, 1996

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

ComEd

SUBJECT: LaSalle County Nuclear Power Station Units 1 and 2
Request for Technical Specification Amendment
Facility Operating License NPF-11 and NPF-18
Main Steam Line Tunnel Leak Detection
NRC Docket Nos. 50-373 and 50-374

Pursuant to 10 CFR 50.90, Commonwealth Edison (ComEd) proposes to amend Appendix A, Technical Specifications, of Facility Operating License NPF-11 and NPF-18. This Technical Specification Amendment Request proposes to change the setpoints for Automatic Primary Containment Isolation on Main Steam Line Tunnel Differential Temperature High and to delete the automatic isolation function on Main Steam Line Tunnel Temperature High. The current setpoints have narrow margin to normal unit operation during summer and fall weather conditions and have no margin during the loss of main steam tunnel ventilation. These leak detection isolation signals cause automatic closure of the Main Steam Isolation Valves and Main Steam Line Drain Isolation valves. The closure of the Main Steam Isolation valves with the reactor mode switch in Run results in an automatic reactor scram. The current setpoints are based on a value for leak detection and isolation of a 25 gpm steam leak in the main steam tunnel. The setpoint for Main Steam Line Tunnel Differential Temperature High is being changed to provide unit operation without spurious trips based on early detection of a steam line break by causing a leak detection automatic isolation on a 100 gpm steam leak. This Technical Specification amendment request is requested to be approved by March 1, 1996, with the amendments becoming effective prior to startup from L1R07 for Unit 1 and prior to startup from L2R07 for Unit 2.

This proposed amendment request is subdivided as follows:

1. Attachment A gives a description and safety analysis of the proposed changes in this amendment.

2. Attachment B includes a summary of the proposed changes and the marked-up Technical Specifications pages for LaSalle Units 1 and 2, with the requested changes indicated.

3. Attachment C describes ComEd's evaluation performed in accordance with 10CFR50.92(c), which confirms that no significant hazard consideration is involved.

4. Attachment D provides an Environmental Assessment Applicability Review per 10 CFR 51.21.

5. Attachment E provides a list of UFSAR References.

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6. Attachment F provides a history of LaSalle Unit 1 and 2 Main Steam Tunnel Leak Detection Isolations.

7. Attachment G provides Calculation Summaries.

8. Attachment H provides a basis for Deletion of Main Steam Line Tunnel Temperature - High Primary Containment Isolation Trip Function.

This request for a Technical Specification Amendment has been reviewed and approved by ComEd Senior Management, as well as On-Site and Off-Site Review in accordance with Commonwealth Edison procedures.

To the best of my knowledge and belief, the statements contained above are true and correct. In some respect these statements are not based on my personal knowledge, but obtained information furnished by other Commonwealth Edison employees, contractor employees, and consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

Commonwealth Edison is notifying the State of Illinois of this application for amendment by transmitting a copy of this letter and its attachments to the designated state official.

Please direct any questions you may have concerning this submittal to this office.

Sincerely,

Gary G Benes

Gary G. Benes
Nuclear Licensing Administrator

Subscribed and Sworn to before me
on this 18th day of
January, 1996.

Mary Jo Yack
Notary Public

OFFICIAL SEAL
MARY JO YACK
NOTARY PUBLIC STATE OF ILLINOIS
MY COMMISSION EXPIRES 11/29/97

Attachments:

A. Description and Safety Analysis of the Proposed Changes
B. Marked-Up Technical Specification Pages
C. Evaluation of Significant Hazards Considerations
D. Environmental Assessment Applicability Review
E. UFSAR References
F. History of LaSalle Unit 1 and 2 Main Steam Tunnel Leak Detection Isolations.
G. Calculation Summaries.
H. Basis for Deletion of Main Steam Line Tunnel Temperature - High Primary Containment Isolation Trip Function.

cc: H. J. Miller - Regional Administrator, Region III
P. G. Brochman - Senior Resident Inspector, LaSalle County Station
M. D. Lynch - Project Manager, NRR
Office of Nuclear Facility Safety - IDNS

ATTACHMENT A

DESCRIPTION OF SAFETY ANALYSIS OF THE PROPOSED CHANGES

Description of the Proposed Change

This Technical Specification Amendment Request proposes to change the setpoints for Automatic Primary Containment Isolation on Main Steam Line Tunnel Differential Temperature High and to delete the automatic isolation function on Main Steam Line Tunnel Temperature High. The current setpoints have narrow margin to normal unit operation during summer and fall weather conditions and have no margin during the loss of main steam tunnel ventilation. These leak detection isolation signals cause automatic closure of the Main Steam Isolation Valves and Main Steam Line Drain Isolation valves. The closure of the Main Steam Isolation valves with the reactor mode switch in Run results in an automatic reactor scram. The current setpoints are based on a value for leak detection and isolation of a 25 gpm steam leak in the main steam tunnel. The setpoint for Main Steam Line Tunnel Differential Temperature High is being changed to provide unit operation without spurious trips based on early detection of a steam line break by causing a leak detection automatic isolation on a 100 gpm steam leak.

Description of the Current Operating License/Technical Specification Requirement

Technical Specification Table 3.3.2-1 requires the following Automatic Primary Containment Isolation instrument trip function to be OPERABLE, with setpoints as listed in Table 3.3.2-2:

1. A.1.d. Main Steam Line Tunnel Temperature - High, with a setpoint of $\leq$ 140°F with an Allowable Value of $\leq$ 146°F; and

2. A.1.e. Main Steam Line Tunnel Differential Temperature - High, with a setpoint of $\leq$ 36°F with an Allowable Value of $\leq$ 42°F.

Table 3.3.2-1 applicable conditions for trip function A.1.d and A.1.e are modified by Table notes (i) and (j). The notes are as follows:

(i) Both channels of each trip system may be placed in an inoperable status for up to 4 hours for required reactor building ventilation system corrective maintenance, filter changes, damper cycling and surveillance tests, other than Surveillance Requirement 4.6.5.1.c, without placing the trip system in the tripped condition.

(j) Both channels of each trip system may be placed in an inoperable status for up to 12 hours for performance of Surveillance Requirement 4.6.5.1.c, without placing the trip system in the tripped condition.

The deletion of the Main Steam Line Tunnel Temperature - High will require changes to Technical Specification Tables 3.3.2-1, 3.2.2-2, 3.3.2-3, and 4.3.2-1. This will affect Trip Function A.1.d in each of these Tables.

Bases for the Current Requirement

The Bases for Technical Specification 3/4.3.2 states the following concerning Isolation Actuation Instrumentation trip settings:

> "Some of the trip settings may have tolerances explicitly stated where both the high and low values are critical and may have a substantial effect on safety. The setpoints of other instrumentation, where only the high or low end of the setting have a direct bearing on safety, are established at a level away from the normal operating range to prevent inadvertent actuation of the systems involved."

The 25 gpm steam leakage isolation value is from General Electric Leakage Detection System Design Specification 22A2870. The assumption for temperature and differential temperature leak detection calculation in the MST was to isolate on a 25 gpm steam leak based on the GE design specification.

The 25 gpm criteria was generic to bound multiple pipe sizes within the Primary Containment. Improved critical crack methodology applied to the design of the LaSalle main steam piping downstream of the outermost containment isolation valves (outboard MSIVs) has been used to form the new basis in conjunction with associated calculations for differential temperature response for steam leak detection.

Per UFSAR section 7.3.2.1, one of the safety design basis for Primary Containment and Reactor Vessel Isolation Control Instrumentation is as follows:

> "To limit the release of radioactive materials to the environs, the primary containment and reactor vessel isolation control system shall, with precision and reliability, initiate timely isolation of penetrations through the primary

> containment whenever the values of monitored variables exceed preselected operational limits."

In addition, the safety design basis for Main Steam Tunnel temperature high and differential temperature high functional units is given in the following excerpts from UFSAR section 7.3.2.2.3.3:

> "High temperature in the space in which the main steamlines are located outside of the primary containment could indicate a breach in a main steamline. Such a breach may also be indicated by high differential temperature between the outlet and inlet ventilation air for this steamline space. The automatic closure of various valves prevents the excessive loss of reactor coolant and the release of significant amount of radioactive material from the reactor coolant pressure boundary..."

> "The main steamline space high temperature trip is set far enough above the temperature expected during operation at rated power to avoid spurious isolation, yet low enough to provide early indication of a steamline break..."

Description of the Need for Amending the Technical Specification

1. The current design of the leak detection system relies on both high temperature and high differential temperature in the main steam line tunnel (MST). Other leak detection is related to the detection of a line break, such as main steam line high flow isolation and reactor vessel low level isolation.

2. The main steam line tunnel (MST) is cooled by ventilation air induced into the tunnel from various areas of the reactor building. This air enters the tunnel at Elevation 687', which is the bottom of the tunnel, and at Elevation 740', which is just below the outboard Main Steam Isolation Valves (MSIV). The temperature of these two air streams increases about 25 °F to 30 °F by the time it reaches the exhaust air riser at the top of the MST. This differential temperature rise can increase by up to 5 °F, if there is a significant drop in the supply air temperature to the reactor building. The reason for this is that once the MST inlet temperature drops, the heat flux through the walls will drop and the heat flux through the steam lines will increase, causing the differential temperature to increase.

3. The current setpoints for the leak detection system in the MST are based on the expected temperature or differential temperature that would occur as a result of a 5 gpm leak detection alarm with isolation on a 25 gpm steam leak. The following table shows how the alarms and isolation setpoints were established:

	5 gpm steam leak	25 gpm steam leak
Inlet air temp.	104 °F	104 °F
dT through MST	25 °F	25 °F
dT due to steam	3 °F	11 °F
Temperature setpoint	132 °F	140 °F
Differential Temperature setpoint	28 °F	36 °F

4. The problem with the current setpoint is that the setpoints for the high temperature and high differential temperature leak detection isolations for the MST are too close to normal operating conditions. As a result, minor ventilation or power supply perturbations can cause the isolation setpoint to be approached or reached.

   For example, on 8/16/95, LaSalle Unit 1 scrammed as a result of a MST high temperature leak detection isolation of the MSIVs due to a loss of reactor building ventilation (VR) due to secondary containment isolation. The MST high temperature isolation setpoint of 140 °F was reached in only 6 minutes after the ventilation isolation.

   As another recent example, during the month of September 1995, the LaSalle Unit 2 MST differential temperature approached the isolation setpoint of 36 °F, although there was no steam leak.

5. The fundamental problem with the setpoints so close to normal operating conditions is that reactor operators (nuclear station operators, NSOs) are forced

to bypass these signals in the event of a ventilation or power supply transient, without sufficient time to perform good diagnosis of steam tunnel conditions. As such, this is the most significant "Operator Work Around" at LaSalle Station.

Description of the Amended Technical Specification Requirement

The proposed Technical Specification changes trip function A.1.d, Main Steam Line Tunnel Temperature - High and associated requirements, to "Deleted" in Tables 3.3.2-1, 3.3.2-2, 3.3.2-3, and 4.3.2.1-1.

The proposed Technical Specification setpoints for Table 3.3.2-2, trip function A.1.e, are as follows: Automatic Primary Containment Isolation instrument functional units to be OPERABLE, with setpoints as listed in Table 3.3.2-2:

A.1.e. Main Steam Line Tunnel Differential Temperature - High, with a setpoint of ≤ 65 °F with an Allowable Value of ≤ 70 °F.

The applicable Operational Conditions for the instrumentation channels are given in Technical Specification 3.3.2, table 3.3.2-1 as Operational Conditions 1, 2, and 3, with exceptions provided by Notes (i) and (j). Note (i) remains the same.

The proposed Technical Specification changes Note (j) for trip function A.1.e in Table 3.3.2-1. Note (j) is proposed as follows with changes in italics:

(j) Both channels of each trip system may be placed in an inoperable status for up to 12 hours *due to loss of reactor building ventilation or* for performance of Surveillance Requirement 4.6.5.1.c, without placing the trip system in the tripped condition.

Bases for the Amended Technical Specification Request

Two general criteria have been applied to provide an upper and lower limit for MSIV isolation on a main steam line leak:

1. The isolation setpoint must be high enough to provide operational margin for weather changes, loss of ventilation, loss of normal heating of supply air and other ventilation changes.

2. The isolation setpoint must be low enough to detect a leak less than the leakage from a critical crack in one Main Steam line downstream of the outboard Main Steam Isolation Valves.

The following provides the approach to determining a basis for the changes to the MST leak detection isolation Technical Specifications:

1. Other stations contacted use fan coil units supplied with either service water or chilled water to cool their reactor building MST. Both Nine Mile Point Unit 2 and Susquehana use service water fed fan coil units to cool the MST. They measure the MST temperatures near the top of the area and differential temperatures are measured at the inlet and outlet ventilation duct which supplies a small amount of air to the MST. Both stations have had most of their trouble with the differential temperature, because supply air is directly supplied from outside and dT responds very quickly to the loss of their supply air heaters. Clinton's design is the same except that the differential temperature is measured on the water side of the coil, which results in a more stable differential temperature.

   LaSalle's MST is ventilated with 100% outside air which is tempered by the supply heating coils, and staged through the general areas of the reactor building prior to entering the MST. This ventilation air is the only cooling media for the MST.

2. Because the 25 gpm steam leak design criteria was not based on analytical determination of critical crack size, a critical crack length calculation was performed using realistic assumptions of stresses and piping materials. The calculation of the critical crack and steam flow leak rate for a main steam line downstream of the outboard MSIVs in the MST determined that flow from a critical crack is approximately 1290 gpm. See Attachment G, Section 1, for a calculation summary.

3. Calculation of changes in temperature and differential temperature (T and dT) in response to a steam leak:

   LaSalle determined that an adequate ventilation model for modeling steam tunnel temperature rises from various steam leak sizes did not exist and had to be developed. Previous determinations of temperature rise due to a 5 or 25 gpm steam leak were based on limited calculations and an unsophisticated ventilation model. The steam tunnel was modelled using the GOTHIC computer code to determine the main steam tunnel temperature (MST) response due to a variety of leak rates and supply air temperatures. A calculation summary is included in Attachment G, Section 2. A sketch of the main steam tunnel is shown in Figure 1.

The GOTHIC computer code results were compared with plant data and show good agreement between the calculated results and plant data.

4. The calculations referenced in 2 and 3 above were used to determine the temperatures and differential temperatures achieved under various inlet temperature conditions with leakage from pipe cracks considerably smaller than the leakage from a critical crack.

5. The results of 4 were used to determine the break size that will allow sufficient operational margin prior to reaching the leak detection isolation setpoints, while still being a small fraction of the leakage from a critical crack. The emphasis was to keep the detected crack size as small as possible while allowing sufficient operational margin to spurious trips.

6. A setpoint calculation was done to determine, for the instrument loop that initiates a Group I isolation of the MSIVs & Main Steam Line drain valves upon detection of high main steam tunnel differential temperature, whether there exists available margin between the following:

   a. The Technical Specification allowable and the Nominal Technical Specification Setpoint.

   b. The Analytical Limit and the Nominal Technical Specification Setpoint.

   The calculation is valid under normal operating and accident environmental conditions, and allows for all normal operating and accident errors. Thus Technical Specification compliance is ensured for the instrument channels. See Attachment G, Section 3 for a calculation summary.

7. A 10CFR20 calculation of the offsite dose consequences due to a bounding 200 gpm steam leak in the main steam line tunnel was performed. The results

indicate that both 10CFR20, Appendix I whole body dose limit of 5 mrem per year and Iodine release limit of 1.0 curies per year are met with significant margin. The calculation summary is in Section 4 of Attachment G.

The following provides a summary of the results of the analyses performed for the changes to the MST leak detection isolation Technical Specifications:

1. Based on the calculation of changes in T and dT (Attachment G, Section 2) in response to a steam leak, it was determined that MST high temperature is not a good leak detection parameter. Break sizes of several hundred gpm steam leakage would be required under certain conditions to reach temperature sufficiently above operational limits, e.g. 200 °F. See Figure 2, attached for the MST temperature response due to steam leaks.

2. Based on the calculation of changes in T and dT (Attachment G, Section 2) in response to a steam leak, it was determined that MST high differential temperature is a good indicator for leak detection and that with a steam leakage rate of about 100 gpm differential temperature will be 72.5 °F for the analytical value. See Figure 3, attached for the MST differential temperature response due to steam leaks. The setpoint calculation (Attachment G, Section 3) provides the basis for the difference between the setpoint and allowable value. The calculation determined a nominal setpoint for the main steam line tunnel differential temperature isolation setpoint that ensures a high level of confidence that the analytical limit will not be exceeded under normal or accident operating conditions. The results are as follows:

    a. The nominal trip setpoint is determined to be ≤ 65.6 °F.

    b. The allowable value is determined to be ≤ 70.1 °F.

    In order to reduce the significant digits and remain conservative the values have been rounded down to the nearest whole number for the Technical Specification:

    a. Trip setpoint: ≤ 65 °F.

    b. Allowable value: ≤ 70 °F.

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3. As a result of using differential temperature for leak detection, the leak detection setpoints will not be valid with the ventilation system shut down. Therefore, all channels of dT leak detection isolation for the MST will be inoperable with VR shut down. LaSalle will shut down the affected unit(s) in accordance with the action statements in Technical Specifications, with operability requirement exceptions provided by the notes (i) and (j) of Technical Specification Table 3.3.2-1 as proposed.

The following is the primary basis for the proposed changes to the Technical Specifications:

1. The proposed Technical Specification deletes trip function A.1.d, Main Steam Line Tunnel Temperature - High and associated requirements from Tables 3.3.2-1, 3.3.2-2, 3.3.2-3, and 4.3.2.1-1. The basis for deletion is provided in Attachment H.

2. The proposed Technical Specification setpoints for Table 3.3.2-2, for the Main Steam Line Tunnel Differential Temperature - High setpoints will be 65 °F with an allowable value of 70 °F based on the results of setpoint calculations and the analytical values from calculations of the differential temperature resulting from 100 gpm steam leakage rate.
3. The applicable Operational Conditions for the instrumentation channels are given in Technical Specification 3.3.2, table 3.3.2-1 as Operational Conditions 1, 2, and 3, with exceptions provided by Notes (i) and (j). The Note (j) is proposed to also allow 12 hours for the unplanned loss of Reactor Building Ventilation.

   The 12 hour timeclock for the loss of reactor building ventilation is required to facilitate repairs to the cause of the loss of reactor building ventilation. Compensatory actions are in procedures to ensure no Main Steam line leakage exists. The compensatory actions include monitoring the Main Steam tunnel leak detection temperature indications and sump fill up rates for indications of a leak. The compensatory monitoring and parameters to be monitored were approved as part of LaSalle License amendments 77 for Unit 1 and 61 for Unit 2 (Amendment 77 to Facility Operating License No. NPF-11 and Amendment 61 to Facility Operating License No. NPF-18 were approved by letter from J. B. Hickman, NRR, to T. J. Kovach dated March 21, 1991, Issuance of Amendments (TAC Nos 74370 and 74371)).

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DESCRIPTION OF SAFETY ANALYSIS OF THE PROPOSED CHANGES

The following comments provide additional justification to support proposed Technical Specification changes.

1. The proposed leak detection on MST differential temperature for a 100 gpm steam leak meets General Design Criteria 54 and is established conservatively

   by using a 100 gpm steam leak, which is much less than the leak from a critical crack of 1290 gpm as stated above.

2. Basis for the current 25 gpm steam leak ve sus the new basis for a higher leakage value:

   The 25 gpm steam leakage isolation value is from General Electric Leakage Detection System Design Specification 22A2870. The assumption for temperature and differential temperature leak detection calculation in the MST was to isolate on a 25 gpm steam leak based on the GE design specification.

   The 25 gpm criteria was generic to bound multiple pipe sizes within the Primary Containment. Improved critical crack methodology applied specifically to the design of the LaSalle main steam piping downstream of the outermost containment isolation valves (outboard MSIVs) has been used to form the new basis in conjunction with associated calculations for differential temperature response for steam leak detection.

3. LaSalle accident analysis:

   No credit is taken for leak detection isolation in any of the LaSalle accident analyses. The accident analysis for the main steam piping outside of the primary containment assumes an instantaneous circumferential break of one main steam line. This bounds all steam line failures outside the primary containment.

4. The dose calculation determined that a steam leak of 200 gpm could continue for several weeks without exceeding Appendix I limits. Thus, isolation of a main steam line on a steam leak of 100 gpm is well below the normal operation radionuclide release limits of 10CFR50, Appendix I.

5. Notes (i) and (j) will continue to be required for this trip function for two reasons:

   a. The analyses performed to determine the differential temperature setpoints were based on normal plant operation with reactor building ventilation system in operation. With the reactor building ventilation system not in operation, the Main Steam Line Tunnel Differential Temperature - High is not OPERABLE, because dT depends on ventilation flow for validity.

   b. Manual bypass of the Main Steam Line Tunnel Differential Temperature - High trip function will be required during the differential temperature transient that occurs when reactor building ventilation is restarted. This will prevent an invalid trip of the leak detection logic during the differential temperature transient caused by the rapid ventilation flow increase that occurs when the reactor building ventilation system is started.

The Technical Specifications currently allow the main steam tunnel high temperature and high differential temperature isolation channels to be inoperable for up to 4 or 12 hours during the performance of specified required surveillances. The 12 hours allowed outage time is currently for an 18 month surveillance requirement. The addition of allowance for up to 12 hours allowed outage time to recover normal ventilation following an unplanned loss of normal ventilation is reasonable, since the time is small compared to the time frame over which a pipe crack grows. Also, supplemental monitoring of water collection sumps and area temperature in the main steam line tunnel provides operators with a heightened awareness to detect leakage in the main steam line tunnel during the time normal ventilation is not available. The planned shutdown of normal ventilation is currently allowed for up to 4 hours by the Technical Specifications. The unplanned loss of normal ventilation is expected to be less than two times per cycle upon completion of planned design changes in the next refuel outage on each unit.

Also, restoration of leak detection for the steam tunnel by recovering normal ventilation within 12 hours prior to beginning unit shutdown to close the main steam line isolation valves is less risk significant. Currently, upon loss of normal ventilation, per Limiting Condition for Operation Action c.1, within one hour a channel must be placed in the trip condition, and per Action c.2.b and Table 3.3.2-1, Action 21 of Table 3.3.2-1 a unit shutdown to Hot Shutdown within 12 hours and Cold Shutdown within the following 24 hours is required. Not having to place channels in the tripped condition within the additional 12 hour time frame allows restoration of normal ventilation following any repair or adjustments needed and avoidance of an unplanned forced unit shutdown. Unit shutdown itself is somewhat risk significant compared to the short time allowed on loss of normal ventilation. Design changes related to improving system reliability are discussed below.

To reduce the frequency of spurious secondary containment isolations and the subsequent loss of ventilation flow through the MST, LaSalle is implementing the following enhancements:

1. The power supply for the PCIS logic for secondary containment will be changed from RPS power to safety related 125 Volt DC power. This change is expected to eliminate the majority of spurious secondary containment isolations. This will be done in L2R07 for Unit 2 and L1R08 for Unit 1.

2. Some of the thermocouples for the temperature and differential temperature sensors are being relocated into the return air riser to provide steadier and more accurate readings. This will be done in L1R07 for Unit 1 and L2R07 for Unit 2.

Schedule

This Technical Specification amendment request is requested to be approved by March 1, 1996, with the amendments becoming effective prior to startup from L1R07 for Unit 1 and prior to startup from L2R07 for Unit 2.