MISSISSIPPI POWER & LIGHT COMPANY
Helping Build Mississippi
P. O. BOX 1640, JACKSON, MISSISSIPPI 39215-1640

May 30, 1986

O. D. KINGSLEY, JR.
VICE PRESIDENT NUCLEAR OPERATIONS

U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D. C. 20555

Attention: Mr. Harold R. Denton, Director

Dear Mr. Denton:

SUBJECT: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
MSIV Leakage Control System
Instrument Line Valves
AECM-86/0128

REFERENCE: Letter to H. R. Denton, NRC, from O. D. Kingsley, Jr., MP&L, dated December 17, 1985 (AECM-85/0369)

In April 1982, Mississippi Power & Light Company (MP&L) committed to add four motor operated valves (MOVs), capable of being manually operated from the control room with corresponding valve position indication located in the control room, to the MSIV-LCS instrument line. Subsequently two additional lines, in RHR-C and LPCS, were identified as having a similar situation.

In December 1985 MP&L requested deferral of this commitment from the first refueling outage to the second refueling outage. Following discussions with your staff, MP&L conducted an engineering analysis and safety evaluation on the MSIV-LCS lines and the two similar instrument lines in RHR-C and LPCS. The results of this evaluation are discussed in Attachment 1. As a result, MP&L has determined the addition of the MOVs is not necessary to meet applicable safety requirements. MP&L, therefore, wishes to withdraw the commitment to add MOVs to these instrument lines.

NRC review and concurrence with the elimination of the commitment to add these MOVs is requested by June 30, 1986 to allow time for the planning and scheduling of required work and manpower allocation for the first refueling outage which is scheduled to commence in September 1986.

Yours truly,

ODK:dmm
Attachment

cc: (See Next Page)

A001
1/1

cc: Mr. T. H. Cloninger (w/a)
Mr. R. B. McGehee (w/a)
Mr. N. S. Reynolds (w/a)
Mr. H. L. Thomas (w/o)
Mr. R. C. Butcher (w/a)

Mr. James M. Taylor, Director (w/a)
Office of Inspection & Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. J. Nelson Grace, Regional Administrator (w/a)
U.S. Nuclear Regulatory Commission
Region II
101 Marietta St., N.W., Suite 2900
Atlanta, Georgia 30323

Introduction

In April 1982, MP&L committed to add four motor operated valves (MOVs), capable of being manually operated from the control room with corresponding valve position indication located in the control room, to the MSIV-LCS instrument line. Subsequently two additional lines, in RHR-C and LPCS, were identified as having a similar situation. MP&L has conducted an engineering analysis and safety evaluation to determine the need for this commitment. The results of this evaluation follow:

The consequences of these instrument line breaks are not specifically addressed in the FSAR. However, an evaluation of the consequences of these breaks has been performed using the guidelines of SRP 15.6.2. This analysis assumed the plant was operated according to plant operating procedures and all applicable technical specifications.

Main Steam Isolation Valve - Leakage Control System MSIV-LCS

A postulated break in an MSIV-LCS instrument line, concurrent with a single active failure of the upstream MSIV to close, would constitute an unisolable breach of the reactor coolant boundary. The only mitigating action for this breach, following detection, is a reactor shutdown and depressurization of the reactor coolant system.

This evaluation assumed that the plant was operating at the maximum equilibrium primary coolant activity level of 0.2E-6 Ci/g dose equivalent I-131 at the time of the instrument line break. This assumed activity level is consistent with Technical Specification 3/4.4.5.

The worst case break was assumed to occur in the portion of the instrument line downstream of the root valve and pipe-to-tubing connection. The tubing inside diameter is 0.281 inches. A break in a line of this configuration was calculated to result in flow of 1615 lb/hr of steam.

The break was assumed to result in a ground level release until detection. The on-line fuel handling area exhaust effluent monitors are not sufficiently sensitive to readily detect the expected slight increase in radiation levels.

Detection of an MSIV-LCS instrument line break could be made in several different ways: detection of airborne radioactive iodine, loss of function of the associated pressure transmitter, temperature increase in the steam tunnel, or direct observation. Each of these and the associated time required for detection is discussed below:

The increased activity (due to iodine) would collect on the GE detector sample cartridge, but would be determined only after the sample cartridge is removed and counted. Cartridges are removed once a week and an analysis completed within 48 hours after removal (Ref. Tech Spec 3/4.11.2). Assuming the line break occurs at the beginning of the changeout period (7 days), 48 hours pass for counting before notification (2 days), then health physics personnel locate the activity source within 24 hours (1 day), which is judged to be a conservative time period, it is possible that detection of an airborne source might take up to 10 days.

A break in the instrument line would cause the pressure transmitter to register a lack of pressure. Technical Specification 4.6.1.4.d.1 requires a surveillance channel check of the MSIV-LCS pressure transmitters at least once per 24 hours. The limiting condition of operation (LCO) action for one system being inoperable requires that the subsystem be restored within 30 days. Plant procedures, however, are written to ensure rapid identification of inoperable systems. Therefore, it is judged that the inoperable pressure transmitter would be diagnosed as a result of an instrument line break and, therefore, detected within 24 hours.

The routing of the instrument line originates in the main steam tunnel and runs to a panel located in an adjacent corridor of the auxiliary building at Elevation 119'-0". Therefore, these two rooms are the areas in which the instrument break is postulated to occur. If the break occurs in the main steam tunnel, a temperature rise of 40°F is expected within 100 minutes (1.67 hours). Area temperature detectors in the main steam tunnel display temperature alarms in the plant computer beginning at a level of 80°F and in 10 degree increments above that. The technical specification limit for area temperature in the main steam tunnel is 125°F (Ref: Technical Specification 3/4.7.8). Since normal temperature in the main steam tunnel is above 100°F, a temperature rise of 40°F would be readily detected by plant systems and personnel. The time period for detection is conservatively judged to be 24 hours.

If the break occurs in the corridor area of the auxiliary building, a sufficient temperature rise is not expected which would indicate through the area temperature monitors. The technical specification limit for area temperature in the auxiliary building is 104°F. (Ref: Technical Specification 3/4.7.8). Credit can be taken, however, for routine "ops rounds" conducted by plant personnel, which provide surveillance and inspection of accessible plant areas. These rounds are conducted once every 8 hours. Such observations would easily detect this steam leak either visually or audibly. Subsequent investigation by plant personnel to determine the source of the leak is conservatively estimated to take 24 hours.

Considering the various methods of detecting a postulated MSIV-LCS instrument line break, the detection period for the purposes of determining offsite doses is conservatively judged to be 10 days. Releases to the site boundary are not to exceed 2.5 rem whole body dose or a thyroid dose limit of 30 rem.

The dose rate at the site boundary during the detection period is calculated to be 2.72E-4 rem/10 minute period thyroid and 3.23E-5 rem/10 minute period whole body. Therefore, doses at the site boundary during the detection period of 10 days are 0.39 rem thyroid and 0.05 rem whole body.

Once the operator initiates shutdown to isolate the break, SRP 15.6.2 requires that iodine spiking be taken into account. Consequently the fission product activity release rate has been assumed to increase by a factor of 500.

It is also conservatively assumed that Standby Gas Treatment System (SGTS) operation is not initiated. In reality, manual initiation of SGTS would allow for filtration of the release and substantially reducing offsite radiological consequences.

Assuming a reactor coolant temperature shutdown rate of 100°F/hr and an initial temperature of 550°F, blowdown through the instrument line break will terminate in approximately 3 - 4 hours. The site boundary doses during a conservative shutdown period of 8 hours are calculated to be 6.4 rem thyroid and 0.04 rem whole body. These are well below the limits discussed in SRP 15.6.2, which are 30 rem thyroid and 2.5 rem whole body. In practice, it is judged that if the postulated doses were actually generated during the shutdown, an indication of high radiation from the Eberline fuel handling area effluent monitor would alert the operators to initiate the standby gas treatment system (SGTS). These calculated thyroid doses would then be even further reduced by the operation of the SGTS, which is 99% efficient in removing iodine activity.

The consequences of this instrument line failure are, therefore, acceptable according to the guidance in SRP 15.6.2 and are bounded by the results of other accidents evaluated in Chapter 15 of the FSAR.

Residual Heat Removal and Low Pressure Core Spray Pressure Interlock

Instrument sensing lines servicing pressure transmitters off the RHR-C and LPCS lines between the motor-operated injection and check isolation valves were also included in this evaluation. These transmitters provide an interlock signal which prevents remote manual opening of the motor-operated valves for testing if pressure is above 50 psig. This precludes damage to the low pressure piping upstream.

During normal power operation, the RHR and LPCS lines are not in use and the motor-operated injection valves are closed. The break was assumed to occur in the portion of the instrument line downstream of the root valve and pipe-to-tubing connection. A postulated instrument line break concurrent with leakage of the inboard check valve results in an unisolable breach of the reactor coolant pressure boundary.

The RHR-C line is normally filled with water. A postulated instrument line break would therefore result in a liquid release, flashing to steam, caused by leakage past the inboard containment isolation check valve.

Technical Specification 3/4.4.3.2 indicates a maximum allowable leakage through the inboard check valve to be 1 gpm at reactor coolant system pressure of 1060 psig. Therefore, an instrument line break is assumed to result in a 1 gpm leak outside of containment.

Detection of an RHR-C instrument line break could be made in one of several ways as discussed below:

The increased activity (due to Iodine) would collect on the GE detector sample cartridge, but would be determined only after the sample cartridge is removed and counted. Cartridges are removed once a week and an analysis completed within 48 hours after removal (Ref: Technical Specification 3/4.11.2). The counting process would discover the increased activity if the instrument line broke anytime during the week before changeout of the cartridge. Assuming the line break occurs at the beginning of the changeout period (7 days), 48 hours pass for counting before notification (2 days), then health physics personnel locate the activity source within 24 hours (1 day), which is judged to be a conservative time period, it is possible that detection of an airborne source might take up to 10 days.

A temperature rise is expected to result from the break. Room temperatures are monitored every 12 hours. The technical specification limit for area temperature in the ECCS rooms is 150°F (Ref: Technical Specification 3/4.7.8). Also credit can be taken for routine area inspections conducted by plant personnel. These inspections are conducted once every 8 hours. Such observations should detect this steam leak either visually or audibly. Subsequent investigation by plant personnel to determine the source of the leak is conservatively estimated to take 24 hours.

Considering the various methods of detecting a postulated instrument line break for these lines, the detection period for the purposes of determining offsite doses is conservatively judged to be 10 days.

For an instrument line break off the RHR-C line, the dose rate at the site boundary during the detection period is calculated to be 1.18E-3 rem/10 minute period thyroid and 7.36E-6 rem/10 minute period whole body. Therefore, doses at the site boundary during the detection period of 10 days are 1.7 rem thyroid and 0.01 rem whole body.

Once the operator initiates shutdown to isolate the break, SRP 15.6.2 requires that the fission product activity release rate increase by a factor of 500. This evaluation also assumes that no credit is taken for initiating SGTS operation.

Assuming a reactor coolant temperature shutdown rate of 100°F/hr and an initial temperature of 550°F, blowdown through the instrument line break will terminate in approximately 3-4 hours. The site boundary doses during a conservative blowdown period of 7 hours are calculated to be 2.9 rem thyroid and 2.4E-3 rem whole body. These doses, in conjunction with the doses calculated for the detection period, are well below the limits discussed in SRP 15.6.2, which are 30 rem thyroid and 2.5 rem whole body.

A break in the LPCS instrument line was not analyzed separately, but would be similar to either an MSIV-LCS or an RHR-C instrument line break. During normal power operation, the LPCS injection line is empty downstream of the motor-operated isolation valve, and an expected leak would be steam from the reactor pressure vessel. This situation is similar to the MSIV-LCS instrument line break case discussed above and would be bounded by the MSIV-LCS case. However, if LPCS were being operated, the leakage would be reactor water and not steam, and the analysis would be similar to the analysis of the RHR-C instrument line break described above.

Conclusions

Based on a conservative detection period of 10 days, the very conservative use of the 0-2 hour site boundary X/Q from UFSAR Table 15.6-12 for the entire period of the event, and a 7-8 hour shutdown period, the worst case total doses from an MSIV-LCS, LPCS, or RHR-C instrument line break are 6.79 rem thyroid and 0.09 rem whole body. These doses are well below the 10CFR 100 limits specified in SRP 15.6.2.

Based on the results of this safety evaluation, MP&L concludes the addition of MSIV-LCS, RHR, and LPCS MOVs is not necessary to meet applicable safety requirements and assure the health and safety of the public.