MISSISSIPPI POWER & LIGHT COMPANY
Helping Build Mississippi
P. O. BOX 1640, JACKSON, MISSISSIPPI 39205

NUCLEAR LICENSING & SAFETY DEPARTMENT

August 13, 1984

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

Attention: Mr. Harold R. Denton, Director

Dear Mr. Denton:

SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416 & 50-417
License No. NPF-13
File: 0260/L-860.0
Request for Exemption in
Accordance with
10CFR50.12(a) - (10CFR50,
Appendix J)
AECM-84/0415

As recently discussed with your staff, Mississippi Power and Light Company (MP&L) has identified a need for an operating license condition and associated exemption from certain regulations. To the extent that current design does not comply fully with the latest NRC requirements applied to GGNS, MP&L requests a partial, schedular exemption from 10CFR50, Appendix J, as discussed herein.

Based on your staff's guidance and pursuant to 10CFR50.12(a), MP&L transmits its evaluation of the justification for a partial, schedular exemption to the regulations identified in Attachment 1. This attachment provides the information required by 10CFR50.12(a), including a description of the issue addressed in the exemption and the basis upon which MP&L concludes that the exemption may be issued.

Attachment 1 provides the basis for the conclusion that there will be no undue risk to the public during the first cycle of operation due to the granting of the requested exemption.

In support of evaluations required by 10CFR51.30, MP&L is also providing in Attachment 2, an assessment of the potential environmental impact associated with the exemption request.

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As discussed in this attachment, there is no significant increase in environmental impact associated with the exemption over the environmental impact associated with no exemption. As a result, MP&L believes that there is ample basis for the NRC staff to conclude that there is no significant environmental impact associated with granting the requested exemption.

Please advise if additional information is required.

Sincerely,

L. F. Dale
Director, Nuclear Licensing & Safety

LFD/sl
Attachment

cc: Mr. R. B. McGehee (w/o)
Mr. N. S. Reynolds (w/o)
Mr. G. B. Taylor (w/o)

Mr. Richard C. DeYoung (w/a)
Office of Inspection & Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. J. P. O'Reilly (w/a)
Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, N.W., Suite 2900
Atlanta, GA 30323

JUSTIFICATION FOR THE REQUIRED EXEMPTION

NRC regulations provide for specific exemptions in 10 CFR 50.12(a). The Commission has provided additional guidance regarding this regulation in an order in the Shoreham proceeding[1], as modified by Commission action on July 25, 1984.[2]

In view of the standards in 10 CFR 50.12(a) and the Commission's guidance regarding the issuance of exemptions, we may synthesize the circumstances in which the requested exemptions are warranted as follows: (1) the activities to be conducted are authorized by law, (2) operation with the exemption does not endanger life or property because such would involve no undue risk to the health and safety of the public; (3) the common defense and security are not endangered, and (4) the exemption is in the public interest because, on balance, there is good cause for granting it (e.g., to avoid unnecessary delay and consequent financial hardship) and the public health and safety are adequately protected.

As demonstrated by the discussion herein, and in some instances supported by previous submittals to the Commission or previous safety evaluation reports, or both, referenced below, MP&L is entitled to the requested exemption.

I. The Requested Exemption and the Activities Which Would Be Allowed Thereunder Are Authorized by Law

MP&L is currently authorized to operate GGNS Unit 1 at low power (5% or less of full power) pursuant to License No. NPF-13, which was issued in accordance with the Atomic Energy Act as amended. GGNS Unit 1 has completed low power

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1 Order, Long Island Lighting Company (Shoreham Nuclear Power Station, Unit 1), CLI-84-8, May 6, 1984.

2 Staff Requirements Memorandum MB40725A, July 27, 1984.

tests and, with the exception of the matters for which exemptions are sought, is essentially ready to perform the surveilliance tests prerequisite to, and to commence, power ascension.

If the criteria estabiished in 50.12(a) are satisfied, as they are in this case, and if no other prohibition of law exists to preclude the activities which would be authorized by the requested exemption, and there is no such prohibition, then the Commission is authorized by law to grant this exemption request.[3]

II. The Requested Exemptions Will Not Endanger Life or Property

II.A. Description of Issue

General Design Criterion (GDC) 55 of 10 CFR 50, Appendix A requires that each line that is part of the reactor coolant pressure boundary and that penetrates primary containment shall be provided with containment isolation valves. The requirements are that two isolation boundaries be provided which meet one of the GDC combinations consisting of locked closed or automatic isolation valves inside and outside primary containment, unless it can be demonstrated that the containment isolation provisions for a specific class of lines are acceptable on some other defined basis.

Implementation of this criterion for the GGNS feedwater system recognizes the paramount importance of maintaining reactor coolant make-up from all sources of supply. Therefore, in accordance with the guidance provided in ANSI Standard N271-1976, each portion of the feedwater system that forms part of the reactor coolant pressure boundary and penetrates the primary containment has three isolation valves. The isolation valve inside the containment is a simple check

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3 See: U.S. vs. Allegheny-Ludlum Steel Corp., 406 U.S. 742, 755 (1972).

valve (Q1B21-F010 A&B). The isolation valves outside the containment consist of a testable check valve (Q1B21-F032 A&B) located nearest the containment, and a motor operated gate valve (Q1B21-F065 A&B). The F032 operator is designed for testing the free-swing action of the disc. When the solenoids of the testable check valves (Q1B21-F032 A&B) are de-energized, air is vented, and spring pressure will close the check valve disc provided normal feedwater pressure is not working against the valve.

During postulated transients and accidents, it is desirable to maintain feedwater system availability for reactor coolant make-up; and for this reason, the external valves do not automatically isolate upon a signal from the protection system. However, these valves are capable of being remotely closed from the control room to provide leakage protection upon operator judgement that continued make-up from the feedwater source is unnecessary. Should a break occur in the feedwater line, the check valves prevent significant loss of inventory and offer immediate isolation. There is a recognized trade off between minimizing postulated leakage paths and retaining makeup capability. On balance, greater safety is assured by maintaining feedwater supply to the reactor. As indicated in the "Reactor Safety Study Methodology Applications Program: Grand Gulf #1 BWR Power Plant", NUREG/CR-1659/4 of 4, the accident sequence with the highest core melt frequency is a transient initiated event such as loss of feedwater. Therefore, without further evaluation, it clearly is not appropriate to automatically isolate feedwater.

For GGNS, additional design features were provided to prevent radiological leakage from the feedwater system isolation valves by use of a water seal. The water seal is provided by the Feedwater Leakage Control System (FWLCS). Following a LOCA when feedwater is no longer required or available, the operator initiates the FWLCS by starting or verifying the RHR jockey pumps are running and repositioning certain motor operated valves to provide water from the jockey pumps to fill the feedwater lines. As a result of this design feature

providing a pressurized water seal for 30 days, the acceptance criteria for leakage rate testing of the feedwater valves was established as a hydrostatic test of only the F065 A&B valves.

Subsequent to the NRC approval of the FWLCS and leakage testing requirements for feedwater isolation valves, further dynamic analysis of post-LOCA conditions indicated that a positive seal in the feedwater lines could not be assured for a short period of time immediately following the reactor blowdown. Assuming a LOCA and a loss of feedwater, for a short period of time following reactor blowdown, the remaining feedwater and sensible heat in the piping is sufficient to create steam, and pressurize the piping above the drywell pressure. Following FWLCS initiation (conservatively assumed 20 minutes after the start of the accident), feedwater penetration repressurization could take up to 60 minutes following the event for some scenarios using conservative assumptions. Following repressurization by FWLCS, a 30 day dynamic water seal is maintained.

Because of the short period of time that the FWLCS cannot assure a water seal in the feedwater lines following a LOCA, MP&L committed to pneumatically test all of the feedwater containment isolation valves to 10 CFR 50, Appendix J requirements. However, strict interpretation of Appendix J requires that the leakage from the Type C tests for all valves be combined with the leakage from all other Type B & C tests to meet the 0.6 La requirements, where La is the maximum primary reactor containment allowable leakage term. This interpretation is extremely conservative in that the sum of all of the valve leakages for a single containment penetration must be added together instead of accounting for only the leakage from the worst valve. In essence, such an interpretation could penalize a containment isolation design with additional isolation valves over the two barriers required. As a result, addition of the Type C leakage from all six valves and all other combined Type B & C leakage exceeds the 0.6 La requirement. Therefore, MP&L requests a schedular exemption from Appendix J Section III.C.3 acceptance criteria for Type B & C tests as applied to the feedwater isolation valves.

The requested exemption is schedular to the extent that MP&L will take necessary action to come into literal compliance with subject regulation by the startup following the first refueling outage.

II.B Primary Containment, Integrated and Local Leakage Testing

Consistent with MP&L's commitments to conduct Type C testing of valves associated with the feedwater piping penetrations, pneumatic testing is being conducted on the subject valves. The valves associated with these penetrations are listed in FSAR Table 6.2-44 under Containment Penetration Nos. 9 and 10.

For the key valves of interest, the approximate leak rates, based on recent testing, are presented below in standard cubic centimeters per minute (SCCM):

	FW TRAIN A	FW TRAIN B
F010	*	26,300
F032	*	2,900 (Preliminary)
F065	2,200	0

* Results not yet available

Leakage from small diameter valves (3/4 inch) associated with these penetrations (per FSAR Table 6.2-44) was also measured during this testing and has been added to current leakage totals from Type B and C testing. Reference to Type B and C total leakage other than B21-F010, 32, and 65 includes these small diameter valves. The current total value of all other Type B & C tests is approximately 21,000 SCCM. This value is reduced over that reported to the NRC previously in MP&L's December 20, 1983 letter (AECM-83/0774) as a result of isolation valve maintenance and retesting, including additional penetrations requiring pneumatic testing.

For GGNS the maximum allowable leakage term (La), as defined in Appendix J, is approximately 143,000 SCCM. Based on this value the acceptance criteria established in Appendix J are presented below (approximate values):

Maximum Allowable	La	143,000 SCCM
Type A	0.75 La	108,000 SCCM
Type B and C	0.6 La	86,000 SCCM

The latest containment integrated leak rate testing (ILRT) resulted in a leak rate of approximately 47,000 SCCM. This value includes total leakage from certain non-feedwater valves which were originally hydrostatically tested, but were later pneumatically tested.

Based upon available measured leak rate data, the following criteria have been established for leakage from penetration 9 and 10:

1. Leakage from the single valve in either penetration with the highest leak rate PLUS the lowest (check valve) leakage from the other penetration will be less than 0.7 La. Therefore, given a limiting single failure of the feedwater isolation valves and the additional leakage from the other penetration and the ILRT test, the total leakage will be established by test to be less than La.

2. Excluding the valve in each penetration exhibiting the highest leak rate, the total leakage from the remaining four valves PLUS the other Type B/C totals will be less than 0.6 La. Therefore, in each penetration there will be a minimum of two isolation barriers which exhibit acceptable leakage characteristics even when tested pneumatically.

3. In accordance with Section III.A.1(d) of Appendix J, feedwater penetration leakage should be added to the Type A testing results since these penetrations were isolated (B21-F065A and B closed) at the time of the containment ILRT. The penetration leakage based upon the lowest check valve leakage for both penetrations PLUS the previous Type A leak rate value will be less than 0.75 La.

While strict compliance with Appendix J requirements for Type C testing is not achieved, the extensive local and integrated containment leakage testing will establish (1) credible containment isolation barriers, given the worst case single

failure and (2) favorable containment integrated leakage supported by accident analyses.

II.C Appropriate Criteria for Feedwater Line Leakage

The intent of Appendix J containment leakage testing requirements assures that post-accident leakage will not exceed that assumed in radiological dose calculations which demonstrate compliance with the limits of 10 CFR Part 100 and General Design Criterion 19 of 10 CFR 50, Appendix A. For this purpose it is necessary that the containment leakage not exceed La, or approximately 143,000 SCCM at GGNS through the containment walls and all penetrations. To assure a conservative approach, Appendix J establishes margin, with respect to La, for both Type A tests and Type B and C tests. Furthermore, the NRC Staff has interpreted Type C tests to include the leakage from "all valves," even those in a series path for containment penetration. A recent industry Standard, ANS 56.8-1981, Section 6.6.2, advocates a more realistic approach which utilizes the maximum leakage from a single barrier in a series path. Such a position assures that, even with a single failure of a valve to isolate, the leakage would not result in a condition that exceeds the basic safety limit of La. MP&L requests that this position be allowed on an interim basis for determining the acceptable leakage rate for the feedwater isolation valves.

For the feedwater isolation valves described above, appropriate limits on leakage will be met such that La is not exceeded, even given the most limiting single failure. This would imply that the Containment Integrated Leakage Rate Test (ILRT) which demonstrates compliance with Type A test requirements plus the leakage from the feedwater isolation valves in each of the two penetrations, given the limiting single failure, must not exceed La at GGNS. Additionally, the available margin in the GGNS ILRT must be reduced to account for the feedwater check valve leakage since these lines were not initially included in the ILRT per Appendix J, Section III.A.1.(d). As described in Section II.B above, this criteria has the effect of limiting the combined maximum leakage of the two

feedwater penetrations to about 96,000 SCCM. (This leakage is based upon subtracting the ILRT leak rate of approximately 47,000 SCCM from La of about 143,000 SCCM). This leakage rate would exceed the limits of Appendix J for Type B and C tests since the combined leakage would exceed 0.6 La criteria.

Limiting the combined maximum leakage (as discussed above) from the two feedwater penetrations to 96,000 SCCM, while exceeding 0.6 La criteria of Appendix J, still incorporates substantial margin and conservatism to assure that the basic safety limits of 10 CFR Part 100 and GDC 19 are met. The leakage rate from all other Type B and C leak tests are conservatively based upon adding leakage from all valves, even those in series. After the initial 10 minute period during which no operator action is assumed, additional conservatism exists due to the dramatic effect on reducing leakage from the feedwater penetrations that would result from the operator closing both F065 valves. In this case, assuming the most limiting single failure of the feedwater check valves, the maximum leakage from both penetrations COMBINED with other Type B and C leakage is well below 0.6 La.

II.D Justification for Proposed Exemption

Ample justification for the requested exemption exists due to the low probability of an event which could lead to significant radiological leakage, the design of the feedwater isolation system including the FWLCS, and the conservative application of the leakage test results which still is less than the containment leakage assumed in the accident analysis.

The probability of plant conditions which would lead to the potential for significant leakage through the feedwater isolation valves is small. As indicated in RSSMAP, 90% of the overall core melt frequency results from dominant accident sequences which are predominately transient events. Only one of the dominant accident sequences is a small break LOCA, which would not result in long term containment pressures as challenging as those used in leakage rate

testing nor is it likely to provide the conservative radiological source term used for accident analysis. As shown in NEDO-24708, realistic small break scenarios with or without operator action show no fuel failure. Additionally, with feedwater available following a LOCA, a potential leakage path would not be available or postulated. The probability of a large break LOCA resulting in substantial fuel damage with a loss of feedwater and failure of the feedwater isolation valve in a manner which would result in the maximum allowable leakage is extremely small. The requested exemption does not increase the probability of an event which could lead to excessive leakage nor does it increase the consequences of such an event since the exemption would still maintain total containment leakage less than that assumed in the accident analysis.

The requested exemption would still maintain the containment isolation boundaries which are required by GDC 55 and are in accordance with ANSI Standard N271-1976. As indicated in Section II.B, the leakage from the feedwater penetrations with the limiting single leak rate plus the current Type B&C totals is only 36% higher than the Appendix J allowable of .6 La. This exceedance would only exist for a short period of time since the F065 valves would be closed by operator action, as discussed later in this section. If application of the worst single valve leakage per penetration were allowed for all Type C tests, the tested leakage could be near the .6 La. In any event, with the use of the proposed criteria for the feedwater isolation valves, the tested leakage would not exceed La even if one summed the feedwater penetration leakages (limiting check valve failure in one penetration PLUS lowest check valve leakage in other penetration) with the Type A leakage.

Additionally, pneumatic testing of all feedwater isolation valves assumes no credit for the FWLCS which provides an effective long term (greater than 30 days) water seal after the first hour of an accident. Therefore, there is only a small period of time where such leakage paths could exist using conservative assumptions. Furthermore, consideration of various aspects of the feedwater

piping system's design and reliability in maintaining a water seal between the main condenser and the feedwater penetrations provides additional assurance that containment integrity is maintained consistent with the accident analyses. Realistically, even with the limiting check valve failure, one of the valves on each line with the best leakage characteristics would be available such that the accident leakage would be less than that which was used to meet the acceptance criteria. As shown in Section II.B, the F065 A&B valves have extremely small tested leakages. The time period when a significant leakage path may potentially exist and exceed the Appendix J criteria is less than 10 minutes. Operating procedures will be revised to instruct the operator to shut the F065A & B valves following a LOCA if feedwater is not available. As stated in Chapter 6 of the GGNS FSAR, such post-LOCA manual actions are assumed not to occur within 10 minutes even though the F065 valves can be remotely closed from the control room.

Alternatively, assuming the single failure removes the capability to close both F065 valves, then penetration leakage is controlled by the most leaktight check valve in each path. Criterion 3 of Section II.B would require that the containment's integrated leakage (ILRT) COMBINED with the lowest check valve leakage for both penetrations be less than 0.75 La.

In addition, as discussed earlier, appropriate corrective actions will be accomplished to achieve literal compliance with the subject regulations by first refueling outage. The likelihood of the occurrence of an accident resulting in significant fuel damange is very low in the period during which the exemption is being sought.

In summary, the justification provided above adequately demonstrates that the public health and safety would not be jeopardized by approval of this schedular exemption request for the first cycle of GGNS operation.

III. The Requested Exemptions Will Not Endanger the Common Defense and Security

The common defense and security are not implicated in this exemption request. Only the potential impact on public health and safety is at issue.

IV. The Requested Exemption is in the Public Interest

The requested exemption is in the public interest in that any delay in commencement of the power ascension program would cause a day-for-day delay in the attainment of commercial operation and since, as shown above, the health and safety of the public will be adequately protected.

Grand Gulf Unit 1 is physically complete in all essential respects and is ready for power ascension to full power. Upon satisfactory completion of the power ascension program in accordance with the license and technical specifications, the facility will be placed in commercial operation. The requested exemption discussed in Section II above is schedular. In this instance, the delay associated with modifying the FWLCS or the feedwater check valves now rather than at the first refueling outage ranges from one month to several months. Modification of the FWLCS would require design changes and modifications, including procurement of certain safety related equipment. Since the conceptual design has yet to be selected, this option would likely require several months. Modification of the feedwater check valves could range from replacement of the disks to replacement of the valves. Procurement of these components would require at least one month.

In any case, a corresponding delay in commercial operation of Grand Gulf Unit 1 would be occasioned by delay at this stage. Middle South Energy Inc., and South Mississippi Electric Power Association own undivided ownership interests of 90%

and 10%, respectively, in Grand Gulf Nuclear Station Unit 1. Any delay in the commercial operation of Grand Gulf Nuclear Station Unit 1 would cause the cost of the unit to increase at the rate of more than $20 million per month. Under standard ratemaking practices these costs would eventually have to be borne by ratepayers of the affected utilities. This substantial financial impact of a delay in commercial operation on the owners of Grand Gulf Nuclear Station Unit 1 and the customers of the utilities which will receive the output is not warranted inasmuch as, as shown above, the public health and safety are adequately protected.

ENVIRONMENTAL IMPACT ASSESSMENT

1. PROPOSED EXEMPTION

Mississippi Power & Light Company (MP&L) requests a schedular, partial exemption to the acceptance criteria for local leakrate testing of certain containment isolation valves. The subject acceptance criteria are contained in Section III.C.3 of 10 CFR 50, Appendix J and pertains to Type B and C leakage testing of containment penetrations and valves.

The requested exemption is restricted to the plant's two feedwater piping containment penetrations, each of which are provided with three (3) isolation barriers in series. The requested exemption would establish criteria in which the leakage rate for a path would be that associated with the isolation barrier (valve) exhibiting the highest leakage rate. The requested exemption also provides a conservative acceptance criteria for the combined measured leakage rate from the remaining isolation barriers (valves) in the feedwater penetration.

The subject regulation, if strictly interpreted, would require the significantly conservative addition of leakage rates from all barriers in each penetration. The requested exemption proposes a more realistic, yet adequately conservative, application of this regulation in proposing the above described method and criteria for combining and accepting barrier leakage for two subject penetrations.

Additionally, the exemption would allow consideration of the margin in meeting Type A test by slightly exceeding the leakage criteria for Type B & C tests. However, the overall leakage, La, would not exceed that assumed in the radiological accident analyses.

II. ENVIRONMENT IMPACT ASSESSMENT

There are no environmental impacts of the requested exemption. The requested exemption establishes criteria by which leakage of isolation barriers in the feedwater piping penetrations are combined and accepted. The subject acceptance criterion is described in Section III.C.3, 10 CFR 50, Appendix J.

The total leakage allowed is not in access of that already accounted for in the accident analyses. Each penetration is provided by design with three principal, isolation barriers, all of which have been or will be subjected to local leakrate testing with air or nitrogen in accordance with Appendix J. Given the worst case single failure of one isolation valve in the penetrations, combined with the lowest check valve leakage from the other feedwater penetration and the Type A leakage, the total leakage is less than La. Therefore, by the granting of the requested exemption and the implementation of the proposed interpretation of the acceptance criterion specified in Section III.3.C of Appendix J, the radiological consequences of analyzed accidents involving containment leakage are no different from those previously analyzed.

As discussed in Section II.A of the preceding attachment, MP&L will take necessary actions to come into literal compliance with the subject regulation by the startup following the first refueling outage. In addition, also discussed in Section II.A, the current analyses indicate only a small period of time (less than one hour) when leakage through the feedwater penetrations would be expected. Furthermore, consideration of various aspects of the feedwater piping system's design and reliability in maintaining a water seal between the main condenser and the feedwater penetrations provides additional assurance that containment integrity is maintained consistent with the accident analyses. These factors, combined with the low probability of the occurance of an accident resulting in significant fuel damage, MP&L concludes that there is an overall low likelihood that containment integrity would be challenged in the period during which the exemption is being sought.

No aspects of the requested exemption suggest an increase in the probability of a radiological release in excess of that already analyzed or of an event that would lead to an increase in the consequences of analyzed events.

Further the requested exemption does not otherwise significantly affect radiological plant effluents, occupational exposure, non-radiological effluents, or any other non-radiological consequences.

In conclusion, based on the above discussion, supported by information presented or referenced in Section II of Attachment I of this submittal, MP&L has determined that the requested exemption, if granted, has no adverse environmental impact.