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

July 19, 1984

J. B. RICHARD
SENIOR VICE PRESIDENT - NUCLEAR

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-13
File 0260/L-860.0
Supplement to Application for Partial, Temporary Exemption to 10 CFR 50, Appendix A, Criterion 17
AECM-84/0358

In light of the May 22, 1984 Order requiring Mississippi Power & Light Company (MP&L) to disassemble one diesel generator (D/G), MP&L on June 4, 1984, submitted a request for a partial, temporary exemption from the requirements of General Design Criterion (GDC) 17. Subsequently, by letter dated June 22, 1984, the NRC staff requested additional information regarding MP&L's GDC-17 exemption request.

The purpose of this letter is to supplement MP&L's previous exemption request with the responses to the questions contained in the NRC's June 22, 1984 letter. These responses are contained in Attachment 1 to this letter. As discussed below and in Attachment 1, this submittal also serves to explicitly expand the scope of MP&L's previously submitted exemption request to include a partial, temporary exemption from GDC-1 and GDC-2 as they apply to the gas turbine generators (GTG) presently installed at the Grand Gulf Nuclear Station (GGNS).

The Staff's June 22, 1984 letter also requested that MP&L address certain general design criteria which were referenced but not explicitly discussed in the previous MP&L submittal.

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In the June 4, 1984 submittal MP&L stated that:

> "Based on its review of the regulations, MP&L believes that a lack of literal compliance with GDC-17 may indirectly result in a lack of literal compliance with other GDC (e.g., GDC-33, GDC-34, GDC-35, GDC-38, GDC-41, and GDC-44) . . . to the extent that the Commission or NRC staff conclude that residual aspects of this request call into effect other regulations, this application is deemed to expressly request an exemption from such regulations."

For this reason MP&L's submittal did not address the referenced criteria. However, since the Staff requested these and other criteria be addressed explicitly, they are discussed in Attachment 1 to this letter. Additionally, in MP&L's June 4, 1984 request, it is stated:

> ". . . to the extent that the compensating sources of onsite power are deemed to be out of conformance with the regulations and such compensating factors are deemed to be mandatory, this application should be considered to explicitly seek exemption from such regulations."

It is MP&L's position that this statement, when taken in conjunction with the Staff's treatment of the GTG system in the safety evaluation report appended to the May 22, 1984 Order, satisfied the requirements of requesting exemption from GDC-1 and GDC-2 as they apply to the GTG system. However, in light of the Staff's request that GDC-1 and GDC-2 be addressed in MP&L's exemption request, MP&L hereby requests temporary exemption from GDC-1 and GDC-2 as they apply to the GTG system. The justification for such exemption is supported by that information put forward in MP&L's June 4, 1984 submittal. Additional justification, specific to these GDC, is contained in Attachment 1 to this letter.

Based on the information provided and referenced in this submittal and MP&L's June 4, 1984 submittal, MP&L concludes that the requested exemptions from GDC-1, GDC-2, and GDC-17 for GGNS Unit 1 satisfy the criteria set forth in 10 CFR 50.12(a) and the Commission's interpretation, as given in the Shoreham proceedings, and are, therefore, justified.

As described in Attachment 2, recent developments in financial negotiations and neutron startup source rejuvenation have changed somewhat the exigent circumstances stated in MP&L's June 4, 1984 submittal. However, MP&L believes that exigent circumstances still exist to support granting an exemption.

Yours truly,

JBR:lm
Attachment

cc: (See Next Page)
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MISSISSIPPI POWER & LIGHT COMPANY

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

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

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

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AFFIDAVIT

STATE OF MISSISSIPPI
COUNTY OF HINDS

J. B. Richard, being duly sworn, states that he is Senior Vice President - Nuclear, of Mississippi Power & Light Company; that he is authorized on the part of said Company to sign and file with the Nuclear Regulatory Commission this exemption request on behalf of said Company, Middle South Energy, Inc. and South Mississippi Electric Power Association; that he signed the foregoing exemption request as Senior Vice President - Nuclear, of Mississippi Power & Light Company; and that the statements made and the matters set forth therein are true and correct to the best of his knowledge, information and belief.

J. B. Richard

J. B. Richard

SUBSCRIBED AND SWORN TO before me, a Notary Public, in and for the County and State above named, this 19th day of July, 1984.

(SEAL)

Paul A. Richardson

Notary Public

My commission expires:
October 27, 1989

MP&L RESPONSES TO NRC
REQUEST FOR ADDITIONAL INFORMATION REGARDING
MP&L APPLICATION FOR PARTIAL, TEMPORARY
EXEMPTION TO 10 CFR PART 50, APPENDIX A, CRITERION 17

QUESTION

1. In addition to GDC-17 several other General Design Criteria (GDC-33, 34, 35, 38, 41 and 44) address the need for both onsite and offsite power. Each of these additional GDCs should be addressed explicitly in your request for exemption. Also, GDC-1 and GDC-2 should be addressed in your request for exemption.

RESPONSE

The following information is provided in response to the above mentioned NRC requests. Based on MP&L's review, the only additional GDC for which an exemption request is needed are GDC-1 and GDC-2 as they apply to the gas turbine generator (GTG) system.

GDC-33 "Reactor Coolant Make-up"

The purpose of the GDC-33 is to ensure that appropriate systems, including associated electrical power supplies, are provided to supply reactor coolant make-up for protection against small breaks in the reactor coolant pressure boundary. The system safety function to be met is that of assuring that specified acceptable fuel design limits are not exceeded as a result of reactor coolant loss due to small breaks in the reactor coolant pressure boundary or other small components which are part of the boundary. GDC-33 specifically requires that this system safety function be assured under two independent assumptions of initial conditions (i.e., under two separate cases). Case 1 is under conditions where offsite electrical power supply systems are unavailable; Case 2 is under conditions where the required onsite electrical power supply systems are unavailable.

This GDC is intended to set a standard for the design of the systems used to provide reactor coolant make-up. The requested exemption to GDC-17 has no relation or impact on the design of these systems at GGNS Unit 1. They have been designed to accomplish the system safety function under the required assumptions.

The GDC-17 exemption request does, however, indirectly relate to GDC-33 in that the availability of the sources of electrical power supply (in particular the sources of onsite power supply) are affected.

If it is shown that the compensatory measures underlying the GDC-17 exemption request satisfy the onsite emergency electrical power supply availability concern and if it is shown that, in doing so, the reactor coolant make-up system safety function is not impaired, then no exemption to GDC-33 is required.

Under the assumption that the Division I TDI diesel generator (D/G) is unavailiable (due to its being out of service for inspection) the remaining sources of onsite emergency power supply are: the Division II TDI D/G, the Division III D/G, and the GTG system. It should be noted that GDC-33 does not require the assumption of an additional single failure beyond the assumption of multiple failures resulting in the loss of all offsite power supplies.

Even if one also assumes that the Division II TDI D/G is unavailable (an extremely conservative assumption), the normal reactor coolant make-up systems will be supplied by the GTG system. In addition, reactor coolant inventory make-up is provided by the steam-driven RCIC pump and by the HPCS system which is separately powered by the Division III D/G.

Consequently, since any one of these systems can adequately accomplish the system safety function for power levels less than 5%, no exemption from GDC-33 is required. If the staff concludes that it is necessary to take credit for the GTG system, whereas in the safety evaluation they assumed no credit, to ensure that the GDC-33 system safety function is met, then an exemption to GDC-1 and GDC-2 may be warranted. However, as indicated below, MP&L is now requesting an exemption to GDC-1 and GDC-2 in conjunction with its request for an exemption to GDC-17; therefore, this specific question is now moot.

GDC-34, "Residual Heat Removal"

As was the case with GDC-33, the purpose of this GDC is to ensure that appropriate systems, including associated electrical power supplies, are provided to accomplish the specified safety function. The system safety function in this case is to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel limits and the design conditions of the reactor coolant pressure boundary are not exceeded.

The two cases related to availability of offsite and onsite power supplies noted above also apply to this GDC. However, the assumption of an additional single failure does apply to GDC-34.

Consequently, if one is required to assume that both Division I and Division II D/Gs are unavailable (a very conservative assumption), the only onsite emergency power supplies available are the Division III D/G and the GTG system. As indicated in MP&L's June 4, 1984 submittal (AECM-84/0291), the HPCS system provides sufficient core cooling to provide ample time to restore offsite power. Upon restoration of offsite power, the residual heat removal system safety function is assured. Accordingly, if one assumes that the single failure is the loss of the GTG system, GDC-34 is met for operations up to 5% power. Similarly, if the single failure is assumed to be the HPCS system, then GDC-34 is met through the operation of the GTG system. However, as indicated above, this does require an additional exemption to GDC-1 and GDC-2.

GDC-35, "Emergency Core Cooling"

As is the case with GDC-34, this criterion requires that the system safety function be assured under the two independent assumptions related to the availability of the offsite and on-site power supplies. In additon, as is the case with GDC-34, GDC-35 requires the assumption of an additional single failure.

In the submittal of June 4, 1984, MP&L demonstrated that this system safety function would be met and that sufficient time would be available for restoration of offsite power supplies or restoration of either the GTG system

or the Division II D/G. The analysis underlying this conclusion assumed the additional single failure of the GTG system.

As a result, no exemption from GDC-35 is needed for operations up to 5% power. Assumption of the single failure of the HPCS system would, however, result in the need for an exemption to GDC-1 and GDC-2 for the GTG system. As indicated below, MP&L is now requesting such an exemption.

GDC-38, "Containment Heat Removal"

The situation with respect to GDC-38 is similar to that which is described above for GDC-34. Additional technical information related to this GDC is provided in Attachment 4 to MP&L's May 6, 1984 submittal to the NRC (AECM-84/0271). The analysis underlying MP&L's conclusions presented in that attachment assumed that the HPCS system was operable and assumed the single failure of the GTG system. It showed that ample time (7.3 days) was available to restore other power supplies for operations up to 5% power.

As a result, no exemption from GDC-38 is needed for operations up to 5% power. Assumption of the single failure of the HPCS system would, however, result in the need for an exemption to GDC-1 and GDC-2 as they apply to the GTG system. As indicated below, MP&L is now requesting such an exemption.

GDC-41, "Containment Atmosphere Clean-up"

This situation is similar to that which is discussed for GDC-35 above. The underlying analysis supporting MP&L's submittal of June 4, 1984 with respect to ECCS performance at power levels up to 5% power demonstrates that ample time exists to restore electrical power supplies prior to reaching 10 CFR 50.46 and Appendix K limits, and that there would be no release of fission products to the containment due to the significant margin between the 10 CFR 50.46 temperature limit and the temperature at which cladding perforation would occur. That analysis assumed both the GTG system and the HPCS system unavailable, thereby exceeding the single failure criteria.

As a result, no exemption from GDC-41 is needed for operation up to 5% power.

GDC-44, "Cooling Water"

This situation is similar to that which is discussed for GDC-34 above. The discussion, references and conclusion reached under GDC-34 also apply to GDC-44.

GDC-1, "Quality Standards and Records"

(a) GGNS TDI Diesel Generators

A generic discussion of compliance with GDC-1 for GGNS is presented in the GGNS FSAR Subsection 3.1.2. In that the Division I and II TDI D/Gs are classified as safety related, this FSAR discussion and the related program implemented to achieve conformance to GDC-1 apply to the GGNS TDI D/Gs. Additional information substantiating the implementation of a quality assurance program by MP&L and its architect/engineer, Bechtel Power Corporation, as it applies to the GGNS TDI D/Gs, was provided in

the MP&L submittal dated November 15, 1983 (AECM-83/0724). This information was also discussed with the NRC Staff in a meeting held October 18, 1983. Additional information pertaining to the quality of design and manufacture of GGNS TDI D/Gs was submitted in the MP&L letter dated July 5, 1984 (AECM-84/0345).

As noted in the MP&L submittal dated February 20, 1984 (AECM-84/0103), MP&L is committed to participate fully in the TDI D/G Owners Group program to review and verify the quality of these D/Gs. MP&L considers the Group's Design Review/Quality Revalidation Program to be confirmatory to conclusions already reached by MP&L; namely, that the GGNS TDI D/Gs were designed, manufactured, and tested to quality standards commensurate with the importance of the safety functions these D/Gs support. It is based on the above information, discussed and referenced, that MP&L concludes that no exemption from GDC-1, as it applies to the GGNS TDI D/Gs, is warranted. This position is further substantiated by MP&L's recent test, disassembly and inspection activities.

(b) GGNS Gas Turbine Generators

As discussed previously in this response, MP&L considers that an exemption to GDC-1, as it applies to the GGNS GTGs, is appropriate for the period of power operations during which the Division I D/G was unavailable. The Division I D/G was made unavailable as a result of the disassembly and inspection of that D/G, in accordance with the Commission Order to MP&L, dated May 22, 1984.

To the extent that the NRC Staff considers in any event that credit must be taken for the GTG system, temporary exemption is necessary from the requirements of GDC-1 because, as indicated in the initial MP&L submittal on this subject dated February 26, 1984 (AECM-84/0113), this power supply system does not qualify as a "safety related" system. However, regardless of the absence of documentation substantiating strict conformance to GDC-1, a number of steps have been taken and are being taken to establish and maintain the quality and reliability of the GTG system so as to satisfy the stated purpose of GDC-1 which is "to provide adequate assurance that these structures, systems, and components will satisfactorily perform their safety functions."

(i) As noted in MP&L's February 26, 1984 submittal, the GTG system was provided to operate the safe shutdown loads of one safety related division. A preoperational testing program for the GTGs was developed and successfully conducted verifying that this function was met by the GTG system.

(ii) MP&L provided in its May 6, 1984 submittal, information supporting the high reliability of GTGs and quantified that system's contribution to the overall reliability of the plant's onsite and offsite AC power supply system. Additional information was

provided to the NRC Staff in the reliability/risk assessment of the overall AC power supply system (AECM-84/0123, May 14, 1984). In regard to the GTGs, this assessment concluded that the GGNS GTG system configuration could be considered a highly reliable source of emergency power for ESF bus loads, given a loss of all offsite power.

(iii) To maintain the capability and reliability of GTGs as established in preoperational testing, MP&L proposed certain surveillance testing requirements to the NRC Staff in the MP&L letter dated May 6, 1984. Upon review of this proposal, the NRC revised as appropriate and issued these surveillances as interim technical specifications, via the NRC Order to MP&L of May 22, 1984. These surveillances provide for the periodic starting and loading of the GTG system. The methods and acceptance criteria for this testing are consistent with the stated function of paragraph (i) above. In addition, standard periodic surveillances are required on the GTG fuel oil system, volume, and fuel oil quality. These surveillances and associated implementing procedures provide added assurance that the GTGs capability and reliability to achieve its intended function will be maintained in a quality manner.

(iv) In that the GTG system was procured and installed as a "nonsafety related" system, the standard records pertaining to design, qualification, etc. were not available. However, in an effort to establish a basis for current confidence that the GTG system is maintained in a manner that is commensurate with its importance to safety, records of all current and future GTG documentation is maintained and available at the plant site. These records include the GTG preoperational test procedures and results, surveillance results, significant project correspondence related to the GTGs, and operator training records.

(v) To insure conformance of the GTG system, operations, and related procedures to MP&L commitments and NRC requirements related to the GTG system, a comprehensive audit was conducted by the MP&L Quality Assurance organization. Overall, this audit provided adequate assurance that the GTG system meets the requirements and commitments prescribed for it by MP&L and the NRC.

In summary, strict conformance to GDC-1 regarding the quality standards and records of GTG system cannot be met. Nevertheless, measures implemented by MP&L do establish and maintain a quality and reliability level commensurate with the safety importance of the GTG system. By these measures MP&L considers that the GTG system, if called upon, will reliably perform its intended function, that it thus satisfies the purpose of GDC-1 and, therefore, concludes that a temporary exemption from GDC-1, as it applies to the GTG system, is justified and poses no undue risks to public health and safety during the very limited period during which the exemption is required.

GDC-2, "Design Bases for Protection Against Natural Phenomena"

MP&L has been requested to revise its request for partial temporary exemption to GDC-17 pertaining to redundant onsite emergency power supplies to address the requirements of GDC-2. The purpose of GDC-2 is to ensure that

structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena without loss of capability to perform their safety functions. The design bases for these structures, systems, and components shall reflect:

a. Consideration of the most severe of the natural phenomena historically reported at the site and surrounding area,

b. Combinations of the effects of normal and accident conditions with the effects of the natural phenomena, and

c. The importance of the safety functions to be performed.

MP&L contends that the existing three emergency D/Gs providing onsite emergency power have been designed and located to meet the requirements of GDC-2. Due to the continuing NRC concerns regarding the reliability of the two GGNS TDI D/Gs, MP&L installed three gas turbine generators (GTGs) with sufficient capacity to operate the safe shutdown loads of one safety related division. The GTG system as installed is a nonsafety related, nonseismic category I, non-Class 1E system as indicated in the MP&L submittal dated February 26, 1984 (AECM-84/0113). The GTGs are designated for use only in the unlikely event of a loss of all offsite power followed by the failure to start of both TDI standby D/Gs.

In light of the fact that the technical basis supporting the NRC's Order of May 22, 1984 relies on the reliability of the GTG system to perform during the period of time when the Division I TDI D/G is being inspected, MP&L, pursuant to 10 CFR 50.12(a), hereby requests a partial temporary exemption from the requirements of GDC-2 as it relates to the GTG system installed at GGNS.

(i) Seismic Capability

As previously stated, the GTG system is not designed and installed to seismic Category I standards. However, the Allison Model No. 501-K gas turbines installed at GGNS are capable of withstanding accelerations in the range of 10-16g's. This information is taken from the Allison Report No. AR. 0001-001 titled "501-K Earthquake Capabilities." The manufacturer has indicated that the gas turbines have passed Navy Barge Tests, which subject the turbines to depth charge originated accelerations up to 23g's while operating. In addition, in the GGNS installation connection between the gas turbines, their auxiliary trailers and fuel supply and electrical distribution, is provided by flexible connections and cable. This allows for movement between the components and, therefore, augments the GTGs capability to withstand a seismic event.

(ii) Flooding

As stated in the safety evaluation attached to the NRC's Order of May 22, 1984, the GTGs are located such that standing water and flooding will not affect their availability. With respect to the

potential impact that the installation of the GTG system may have on the calculated flood level for PMP at the site, the following information is presented. Earthen berms have been placed around the GTGs and auxiliary trailer (approximately 1 ft. in height) to limit the spread of any oil spill to that area. A sump pit is provided at the lowest point in the area enclosed by the earth berms and a sump pump installed to remove any water from rainfall on the area. The sump pump is manually operated from auxiliary power. The installation site of the GTGs and auxiliary trailer is in an area that is lower than final site grade. The site drainage analysis for Probable Maximum Precipitation (PMP) had assumed this area to be at grade in determining the maximum flood height for area "H" (reference GGNS FSAR Figure 2.4-7a). Since this lower area was not considered to attract significant runoff from area "H", and since the GTG installation is not located in the main drainage flow path assumed for area "H", this site alteration will have no net effect on the maximum calculated flood level for PMP.

(iii) Tornadoes

The GGNS offsite power system is very reliable as noted in the NRC Staff's safety evaluation attached to the Order of May 22, 1984. The major contributor to the probability of a total loss of offsite power is a tornado which simultaneously removes from service either the 500KV switchyard and the 115KV line or all three incoming lines. The highest incidence of tornadoes in Mississippi occurs in the month of April and decreases rapidly to a low point in August. The quiet season is June through August. The time period for which this exemption is requested is during the quiet season. Further, as discussed in MP&L's February 26, 1984 submittal, due to their spatial relationship it is very unlikely that a single tornado occurrence could simultaneously take the 115KV offsite power line and the GTGs out of service.

In the May 22, 1984 Order, the NRC Staff reached the same conclusion from its evaluation of the GTG system:

> "In view of the physical location of the gas turbines surrounded by large substantial structures it is highly unlikely that a tornado would damage the gas turbine simultaneously with both the 115 KV and the 500 KV offsite power sources. Therefore the gas turbine power source is expected to be available to the onsite distribution system to provide power to the safe shutdown loads for a tornado event which may damage the offsite power sources."

To provide further assurance that at least one source of power is available to safely shutdown the plant, the NRC's May 22, 1984 Order provided additional operability requirements for the GTGs during tornado warning and watch conditions. These requirements, enforced by the interim technical specifications appended to the Order, require that the GTGs and/or the Division II D/G be started

and brought to rated voltage and speed and maintained running until the adverse weather condition has cleared. Additionally, the gas turbine manufacturer notes that the Allison gas turbines have been subjected to water and ice ingestion tests up to 10 gallons per minute to simulate severe weather operation. The test showed that the gas turbines produce higher output power due to the increase of mass flow and cooling effects.

Based on the above discussion, MP&L contends that it has shown adequate consideration of the most severe natural phenomena at the Grand Gulf site related to the GTG system. Although the GTG system is a nonsafety related, nonseismic category I, non-Class 1E power supply system, there is sufficient information available and appropriate compensating actions are taken to establish a level of protection from natural phenomena which is commensurate with the safety function required. In light of the information provided above, MP&L contends that the GTG system, if called upon, will reliably perform its intended function and, therefore, concludes that a temporary exemption from GDC-2, as it applies to the GTG system, is justified and poses no undue risks to public health and safety during the very limited period during which the exemption is required. The compensatory onsite power sytems meet the intent of GDC-2, that such systems "be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami and seiches without loss of capability to perform their safety functions."

QUESTION

2. In the May 16th Shoreham Order, the Commission stated that "the applicant should include a discussion of its basis for concluding that, at the power levels for which it seeks authorization to operate, operation would be as safe under the conditions proposed by it, as operation would have been with a fully qualified onsite A/C power source." The MP&L exemption request compares operations at 5% power without the TDI diesels to operation at 100% power with TDI diesels. It does not address the criterion provided by the Commission in the Shoreham Order. The application should be amended to show that the proposed operating conditions are as safe as operation at 5% power with fully qualified TDI diesels available.

RESPONSE

In order to justify its position that an exemption to GDC-17 (and now GDC-1 and GDC-2 as discussed in MP&L's response to a previous question by the NRC staff) is warranted, from a safety perspective, MP&L must demonstrate that the proposed conditions under which it seeks a temporary exemption from the above mentioned GDC do not constitute an undue risk to the public health and safety. MP&L believes that, in its previous submittals on this matter, it has demonstrated that this is the case. As discussed below, basic safety limits such as 10 CFR 50, Appendix K and 10 CFR 100 criteria are satisfied. While subject to interpretation, the Commission's criterion in the Shoreham Order may seek an additional level of assurance that any incremental increase in the risk of (or incremental reduction of) the protection of the public health and safety is insignificant.

MP&L considers that the technical criteria for granting relief represented by the Shoreham Order is identical to that already acknowledged and met by MP&L. MP&L interprets "as safe as" (from the subject Order) as meaning the consequences of analyzed events meet the appropriate limits and acceptance criteria established in 10 CFR.

In MP&L's submittals dated May 6 and June 4, 1984, safety analyses were presented demonstrating that operations at 5% power did not result in violation of the fuel performance limits of 10 CFR 50.46, given restoration of any single power supply in a reasonable amount of time. (In Attachment 2 of AECM-84/0291, dated June 4, 1984, the worst case loss of coolant accident (LOCA) evaluation indicates that a power restoration slightly in excess of 60 minutes will prevent peak clad temperature from exceeding 10 CFR 50.46 limits.) Additional conservative assessments of the offsite and control room operator dose consequences, conducted by MP&L and its contractors, given the same LOCA event at 5% power, have revealed that these consequences meet the limits prescribed in 10 CFR 100 and 10 CFR 50, Appendix A (GDC-19). In that operation up to 5% with no TDI diesels available has been determined to meet the limits for critical accident parameters prescribed in 10 CFR, MP&L concludes that the subject operation of GGNS is as safe as such operation with fully qualified TDI diesel generators.

In previous submittals and as augmented by the additional information, presented in this correspondence related to GDC-1 and GDC-2, MP&L has presented information to the NRC staff which, in MP&L's view, clearly demonstrates that it has satisfied any reasonable interpretation of the Commission's criterion in the Shoreham Order.

QUESTION

3. Item (3) in Attachment 2 states "As already noted, only 6 of the events analyzed in Chapter 15 require the assumption of the unavailability of offsite AC power operation." This statement is in direct contradiction to GDC-17. Although the Standard Review Plan does not explicitly address the assumption of the unavailability of offsite power for many transients, GDC-17 does not limit itself to a particular set of transients and accidents. A more appropriate statement might be that the specified acceptable fuel design limits would not be exceeded by assuming the unavailability of offsite power for those transients. Please confirm this is the case and revise your statement accordingly.

RESPONSE

Each event delineated in Chapter 15 of the Grand Gulf FSAR was reviewed against specified acceptable fuel design limits (peak cladding temperature (PCT) and minimum critical power ratio (MCPR)) at 5% power. As a part of the process, this review was performed with offsite power assumed unavailable for those events listed in Chapter 15 which normally assume that offsite power is available. The results indicated that the consequences of the limiting transient events listed in the Grand Gulf FSAR are not adversely affected by the inclusion of this assumption, and the FSAR still bounds the transients for which MCPR limits govern.

The accident events listed in Chapter 15 are bounded by the most limiting loss of coolant accident with PCT being less than or equal to 2200°F.

QUESTION

4. Item (3) of Attachment 2 discusses a LOCA analysis in which a film coefficient of H=0.05 BTU/hr/ft^2/°F is used. Provide additional discussion which clarifies what this particular film coefficient is used for and when it is used.

RESPONSE

The film coefficient of H=0.05 BTU/hr/ft^2/°F is used to account for natural convection heat transfer during the period when the core is uncovered. This value represents the natural circulation heat transfer coefficient resulting from circulation between the bypass region and the core, and applies when the water level is below the bottom of the active fuel but above the bottom of the jet pumps. Once the bottom of the jet pumps uncovers, a much stronger natural circulation flow path is established between the downcomer and the core. A film coefficient of about H=0.5 BTU/hr/ft^2/°F is expected in this situation. Similarly, early in the transient some steam cooling with a film coefficient in excess of H=0.05 BTU/hr/ft^2/°F will occur. Thus, the use of a film coefficient of H=0.05 BTU/hr/ft^2/°F during the entire core uncovery period is conservative in comparison to the expected heat removal capability.

QUESTION

5. Provide additional information concerning the boil-off calculation discussed in Attachment 2.

Items which should be addressed include:

1) Length of time RCIC is assumed to operate and water level at time RCIC is assumed to fail.

2) Details of the calculation of heat losses from the reactor vessel to drywell. In particular:

a) Heat transfer coefficient(s) used and how obtained,

b) Heat capacities for heat sinks in containment and how obtained, and

c) Calculation of drywell temperature.

3) Decay heat.

4) Volume or mass of water above the top of the core.

RESPONSE

1) The RCIC was assumed to operate for one full cycle (approximately 30 minutes), initiating on low-low water level (Level 2) and tripping off on high water level (Level 8).

2a) The heat transfer coefficient used to determine the heat losses from the vessel to the drywell was identical to the overall heat transfer coefficient, U=0.47 BTU/hr/ft^2/°F, used to define the Grand Gulf drywell heating loads. This overall heat transfer coefficient considered the resistance of the shield wall, vessel wall, vessel insulation layers and air gaps between vessel and insulation, insulation layers, and insulation and shield wall.

2b) The heat sink surface areas, volumes, and material properties used in the calculations are as follows:

CONTAINMENT

	Linear Dimensions (ft.)
41.5	Drywell wall outside radius
62	Containment wall inside radius
187.9	Height of containment airspace(1)
3.5	Thickness of containment wall (concrete)
0.0208	Thickness of containment wall steel liner
	Heat Transfer Areas (ft^2)
73,196	Inner surface of containment wall above suppression pool surface(2) with steel liner
18,942	Outer surface of the drywell wall exposed to containment free airspace
52,186	Surface area of all other concrete structures in the containment exposed to containment free airspace
96,007	Surface area (total, exposed) of all other steel structures in the containment(3)
6,666	Surface area of the suppression pool (wetwell side)
3,367	Surface area of the upper pool
	Volumes (ft^3)
62,000/ 36,380	Upper pool volume (total max. volume/drawdown volume)
96,350	Volume of "all other" concrete structures
10,362	Volume of "all other" steel structures(3)

Notes:

1) Distance between the pool surface (nominal water level) and top of containment

2) Includes containment dome area.

3) Including cranes and all associated equipment, crane rails, refueling platforms, tools and support stands, etc.

DRYWELL

	Linear dimensions (ft.)
36.5	Inside radius of drywell wall
5.0	Thickness of the drywell wall (concrete)
0.0208	Thickness of the drywell wall steel liner
16.3333	Outside radius of reactor shield wall
2.0	Thickness of reactor shield wall (concrete)
0.1042/ 0.0625	Thickness of reactor shield wall steel cladding (outside/inside)
0.35	Gap between vessel insulation and reactor shield wall (hot)
13.92	Outside radius of vessel insulation
0.292	Thickness of vessel insulation
2.25	Gap between vessel and vessel insulation (hot)
	Heat transfer areas (ft^2)
554	Weir annulus pool surface area
4323.7	Surface area of the reactor shield wall (outside)
14,621	Surface area of "all other" concrete structures in drywell(1)
	Surface area of exposed steel structures:(3)
93,644	Painted
61,554	Unpainted

Volumes (ft^3)	
52,866	Volume of "all other" concrete structures in drywell(2)
	Volume of exposed steel structures:(3)
4496	Painted
709	Unpainted

Notes:

1) Include drywell roof slab, weir wall, drywell floor, pedestal inner and outer surfaces, along with other concrete floors, walls, columns, etc.

2) For "volume" corresponding to drywell floor, include only uppermost five-foot portion lying interior to weir inside wall.

3) Above data do not include the drywell liner extending from above the weir annulus pool to the drywell roof slab. The surface area and volume of the liner are 15,715 ft^2 and 354 ft^3, respectively.

Material Properties	Density (lbm/ft^3)	Specific Heat (Btu/lbm-°F)	Thermal Conductivity (Btu/hr-°F-ft)
CONTAINMENT			
Containment Wall (Concrete)	150.	0.21	0.8
Containment Wall (Steel Liner)	490.	0.114	26.0(1)
Other Concrete Structures	150.	0.21	0.8
Other Steel Structures	490.	0.114	26.0(1)
DRYWELL			
Drywell Wall (Conrete)	150.	0.21	0.8
Drywell Wall (Steel Liner)	490.	0.114	27.73(1)
Reactor Shield Wall (Concrete)	225.	0.22	1.2
Reactor Shield Wall (Steel Cladding)	490.	0.114	26.0(1)
Other Concrete Structures in Drywell	150.	0.21	0.8
Other Steel Structures In Drywell	490.	0.114	26.0(1)

Note: 1) Painted surface - thermal conductivity = 11.9

2c) The drywell temperature was calculated from an energy balance between the heat losses from the vessel and the heat transfer to the drywell containment heat sinks. The heat losses from the vessel were calculated using the vessel surface area, overall heat transfer coefficient discussed in the response to Question 5.2.a, and the temperature difference between the vessel and the drywell.

The following scenario was used for drywell temperature calculation according to the operator guidelines for a station blackout. The vessel temperature was assumed to be 560°F (saturation temperature at 1118 psia vessel pressure) for thirty minutes. At this time it was assumed that the operator would depressurize the vessel at 100°F/hr in order to maintain the drywell temperature below the 330°F design limit. It was assumed that the operator would continue to depressurize at 100°F/hr until the vessel pressure was reduced to 150 psia (the pressure required to maintain RCIC operation). This occurred at 2.6 hours after the event when the 350°F vessel temperature was maintained. It was assumed that the operator would maintain this vessel pressure and temperature until six hours after the event. At that time it was assumed that battery power to the safety relief valves (SRVs) was lost, thereby closing the SRVs. It was estimated from decay heat that it would take approximately three days for the vessel to pressurize back to 1118 psia and 560°F.

3) The best estimate 1979 ANS 5.1 decay heat model was used with a conservative core average exposure of 1000 MWD/T. This resulted in boildown to the top of the active fuel in about 4-5 days. Use of the Appendix K decay heat model (1971 ANS + 20% - infinite exposure) would result in boildown to the top of the active fuel in about 1 1/2 days.

4) At the time the RCIC tripped off on high water level, the water above the core was saturated at about 600 psia. The total volume of water above the core up to Level 8 is 5914 ft^3.

INFORMATION RELATED
TO MP&L'S EXIGENCY

In MP&L's previous request for exemption, information was provided which supported MP&L's conclusion that the exemption requested was clearly in the public interest. Some of this information was based on financial constraints, calculations related to startup source strength, the regeneration of sources which would result from additional low power operation, and the availability of replacement sources.

MP&L, in its June 4, 1984 submittal, stated that Middle South Energy, Inc. (MSE) had originally covenanted with its creditors that completion (commercial operation) of Unit 1 would occur no later than December 31, 1984. In the event completion was not achieved by this date, MSE's first mortgage bonds and bank borrowings would become due and payable. MP&L indicated that MSE was seeking an extension of this deadline. Negotiations were concluded on June 28, 1984 and extension of the deadline to December 31, 1985 has been approved. As a result, the financial exigency regarding the impact on these negotiations of a delay in operation of Grand Gulf Unit 1, which existed at the time of MP&L's June 4, 1984 submittal, has been removed.

As of the date of this submittal, MP&L's measurements of irradiated source strength and source decay calculations indicate that the existing sources may now be sufficient to support startup for a longer period. This increase in expected source "life" can be attributed to a number of factors, including (1) the additional regeneration of the sources due to low power operations since the date of the Order, and (2) considerable uncertainties in calculating the extent of regeneration rate at low core flux levels while the plant was actually operating.

The effect of this information on MP&L's public interest arguments is offset by a delay in the delivery date for the replacement sources. At present it is expected that replacement sources could not be available onsite until after the beginning of August. It is MP&L's position that this delay, in addition to the other constraints related to source replacement, still support MP&L's arguments that exigent circumstances existed at the time the Order was issued, at the time when the exemption request was submitted, and still exist at the present time.