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

January 23, 1984

NUCLEAR PRODUCTION DEPARTMENT

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
Units 1 and 2
Docket Nos. 50-416 and 50-417
License No. NPF-13
File 0272/L-860.0
Control Room Inleakage
AECM-84/0033

The Mississippi Power & Light Company (MP&L) letter to the NRC, AECM-83/0490, dated August 23, 1983, documented our commitment to conduct plant specific wind tunnel testing in support of higher control room envelope inleakage values. Amendment No. 11 to the facility operating license established an interim period during which higher inleakage is considered acceptable. The subject license condition, Item 3 of Attachment 1 to the operating license, requires that information to support resolution must be provided prior to March 1, 1984.

The attached information is the first of several submittals intended to demonstrate justification for control room envelope inleakage higher than that originally assumed in the Grand Gulf Final Safety Analysis Report. The purpose of this submittal is to advise you that the subject wind tunnel testing is complete. The results of that testing are currently under evaluation to determine the appropriate control room inleakage acceptance criteria. In addition, this submittal presents for your review the methodology being employed to obtain the meteorological relative concentration values (X/Q) from the wind tunnel tests and on-site meteorological data.

On October 27-28, 1983, Dr. Earl Markee (NRC-Accident Evaluation Branch) visited the wind tunnel test facility at Colorado State University in Fort Collins, Colorado. During the visit, Dr. Markee recommended that several changes be made to the Grand Gulf model and test methods. Incorporation of these changes, in addition to modifications made as a result of MP&L and Bechtel observations during the early testing stages, caused the original test schedule to be extended approximately five weeks.

It is our understanding that Dr. Markee also agreed to certain modifications to the NRC Murphy-Campe (M-C) methodology due to the availability of Grand Gulf site specific meteorological data. The changes that were made to the wind tunnel tests and the agreements reached with Dr. Markee on the modified M-C methodology are described in the attachment to this letter.

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As stated in the August 23, 1983 submittal, MP&L proposes that calculated doses to the operators can be decreased by determining an appropriate degree of holdup of the radioactive release within the enclosure building for the initial two minutes following the design basis accident. It is anticipated that the results of this evaluation will be submitted for the NRC Staff review in late January, 1984. The final report on the Grand Gulf wind tunnel tests will also be submitted for your review the last week of January, 1984.

This information is submitted in partial fullfillment of Section 3, Attachment 1 to the Operating License. Resolution of this issue is required by March 1, 1984, to prevent impact to the power ascension test program. MP&L would appreciate your expeditious review and determination on the acceptability of the modified M-C method described in the attachment. MP&L is prepared to meet with your staff on this matter at your convenience.

Please contact this office if further information is required.

Yours truly,

L. F. Dale
Manager of Nuclear Services

MLC/JGC:sad
Attachment

cc: Mr. J. B. Richard (w/a)
Mr. R. B. McGehee (w/o)
Mr. T. B. Conner (w/o)
Mr. G. B. Taylor (w/o)

Mr. Richard C. DeYoung, Director (w/a)
Office of Inspection & Enforcement
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Mr. J. P. O'Reilly, Regional Administrator (w/a)
U.S. Nuclear Regulatory Commission
Region II
101 Marietta St., N.W., Suite 2900
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Attachment to
AECM-84/0033

GRAND GULF WIND TUNNEL TESTS
NRC/MP&L Agreements on Test Methodology

In fulfillment of Mississippi Power & Light (MP&L) commitments to the NRC, Colorado State University (Fort Collins, Colorado) conducted Grand Gulf plant specific wind tunnel tests under the direction of Dr. J. E. Cermek of the Department of Civil Engineering. The model is built to a scale of 1:240 and includes all permanent plant structures. In addition, the models of the circulating water and standby service water cooling towers have the capability of simulating the air flow through the towers in order to preserve the design velocity ratios. A detailed description of the test facility and testing methods will be provided in a final report that will be available in late January, 1984.

Dr. Earl Markee of the NRC Accident Evaluation Branch visited Colorado State University on October 27-28, 1983 to review the testing methods and tour the test facility. After reviewing the preliminary tunnel velocity profiles, which gave a surface roughness of 4 feet, Dr. Markee indicated that the modeled upwind surface roughness in the tunnel was not representative of the actual surface roughness at the Grand Gulf site. The surface roughness length is the height above grade at which the mean wind velocity logarithmic profile disappears. He asked that the appropriate surface roughness length be determined from the onsite meteorological data and the modeled surface roughness length be changed accordingly. Subsequent to his visit, it was determined that the actual Grand Gulf site surface roughness length is approximately 3 feet. This determination was made by analyzing 3 years (8/72-7/74, 76) of onsite meteorological data collected at two separate elevations on the meteorological tower. The tunnel modeled surface roughness length was subsequently changed to 2 feet. The modeled surface roughness of 2 feet is conservative because it produces less ground surface mechanical turbulence and hence less dispersion than the actual surface roughness.

The original testing method measured concentrations only on the west wall of the Control Building. At Dr. Markee's request, the model was reworked to also take concentration measurements on the roof of the Control Building in the area of the upper cabinet rooms. This change resulted in doubling the time required to take concentration measurements because the number of sample points doubled.

Dr. Markee also expressed a concern that the model was constructed to represent the plant once Unit 2 was completed and not in its present state of partial completion. While all parties agreed that the partially completed Unit 2 should not produce concentrations higher than the completed Unit 2, it was decided that a new model of the partially completed Unit 2 Auxiliary and Containment Buildings would be made and confirmatory tests would be run. It should be noted that the above discussed modifications to the testing procedures or facility related to surface roughness, sample point location, and Unit 2 construction stage contributed approximately four to five weeks to the original testing schedule.

During the early testing it was noticed that the operation of the circulating water cooling towers and the standby service water cooling towers could affect the concentration measurements in certain wind directions. Additional tests were added to the test program to determine the effect of the

towers being on or off for the specific wind directions. Even though the circulating water cooling towers will shut down in the event of loss of offsite power, higher concentrations could result from the towers being in operation. If the tests show higher concentrations during tower operation, then these higher concentrations will be used in determining the Xu/Q for that wind direction. The same procedure will be used for the standby service water cooling towers. The additional tests resulted in the testing schedule being extended one week.

While at Colorado State University, Dr. Markee met with Ms. P. K. Wan of Bechtel's Environmental Staff and Dr. J. Halitsky, the MP&L meteorological consultant on this subject. During the discussion, Dr. Markee indicated that in the absence of site specific meteorological and concentration data, the Murphy-Campe methodology is the only method acceptable to the NRC for calculation of control room X/Q values.

However, because of the existence of the Grand Gulf site meteorological data and the Grand Gulf plant specific concentration measurements to be derived from the wind tunnel tests, Dr. Markee indicated that modifications to the Murphy-Campe (M-C) methodology could be made. The modified Murphy-Campe methodology is described below:

(a) Determination of the K/A Value

The M-C methodology calculates the K/A value by using the K expression shown by Equation 1 below:

$$K = k + 2 \qquad (1)$$

where $k = 3/(s/d)^{1.4}$ (2)

and where s = the distance between the containment surface and the receptor location, ft.

d = the diameter of the containment, ft.

Equation 3 below is used to calculate the control room X/Q value.

$$X/Q = K/Au$$

where A = the projected area of the containment, $ft.^2$

u = the wind speed at the 10-meter level, mph

Instead of calculating the K/A in this manner, it will be obtained directly by measuring the Xu/Q, i.e., the K/A, during the wind tunnel testing. The Xu/Qs are directionally dependent. For each wind direction 36 data points on the Control Building were monitored. Twenty were located on the west wall in the vicinity of the control room and 16 were on the roof. An average Xu/Q value over the west wall and the roof will be developed and used to calculate the one hour averaging X/Q for the corresponding locations. The higher of the Xu/Q values for either the roof or the west wall will be used for each wind direction. The ratio of the peak to the average Xu/Q values will also be reported.

(b) Generation of the Required Wind Speed Factor

As stated in the M-C methodology, the 5 percentile X/Q is used for the first time interval (0-8 hours) in the calculation. For subsequent time intervals, the X/Q is reduced to account for long term

meteorological averaging, i.e., the effects of changes in wind speed and direction over progressively longer periods of time. These reduction factors in wind speed and wind direction are in Tables 2 and 3, respectively, of the M-C paper presented in the 13th AEC Air Cleaning Conference. As allowed by Section V.B.2 of the M-C paper, the required 5, 10, 20 and 40 percentile wind speeds used as the wind speed reduction factors have been deduced from the onsite meteorological measurements (8/72-7/74, 76). Since the wind tunnel tests were designed based on wind information collected at the 162 foot elevation, the percentile wind speeds are based on the 162 foot elevation measurements. These are different than those developed from measurements made at a 10-meter level as defined in the Murphy-Campe method. Dr. Markee agreed on the appropriateness of using the 162 foot elevation winds.

(c) The Grand Gulf Control Room X/Q

(i) X/Q Value for 0-8 Hour Averaging Time Period

Consistent with the M-C methodology, the 0-8 hour average X/Q value will be obtained by dividing the Xu/Q, i.e., the K/A values obtained from the wind tunnel tests, by the corresponding 5 percentile wind speeds.

For each release location, directionally dependent X/Qs will be calculated for each of the 16 wind directions. The highest of these 16 calculated X/Qs will be identified and used to represent the maximum 0-8 hour average X/Q value for the associated release location.

(ii) X/Q Values for 8-24, 24-96, and 96-720 Hour Averaging Time Period

The M-C methodology will be used to determine the X/Qs for the 8-24, 24-96 and 96-720 hour time periods. For each time period, the highest sector dependent X/Qs will be identified. If the highest X/Qs occur in the same sector for all time periods, then these X/Qs are the maximum sector X/Q values.

However, if the highest sector X/Q values occur in different sectors, the 16 sets of X/Q values will be used in dose assessments requiring time-integrated concentration considerations. Then the set of X/Q values resulting in the highest time-integrated doses within a sector will be considered to be the maximum X/Q values. Based on preliminary results, it appears that this methodology will not need to be used. Preliminary data indicates that all the highest X/Qs are occurring in the same sector.