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NUCLEAR PRODUCTION DEPARTMENT

August 17, 1983

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
Intergranular Stress Corrosion
Cracking
AECM-83/0481

Your letter to Mississippi Power & Light (MP&L), dated July 27, 1983, requested certain information pertaining to intergranular stress corrosion cracking (IGSCC) for Grand Gulf Nuclear Station (GGNS). This information was requested as a result of inspections at other boiling water reactor plants which have identified extensive IGSCC in certain large-diameter piping. The information provided below along with the enclosed report is submitted in response to your request, referenced above.

QUESTION 1: Identify the materials used and special fabrication methods employed (both in the shop and in the field) to minimize or mitigate IGSCC in piping systems which form the reactor coolant pressure boundary. For non-conforming materials describe, by piping systems, the actions taken or methods utilized (e.g., solution annealing, induction heat stress improvement program, etc.) to mitigate potential IGSCC in the reactor coolant pressure boundary. If measures are planned to be responsive to this concern, provide a detailed schedule for the completion of these actions.

RESPONSE: The materials used in the GGNS reactor coolant pressure boundary (RCPB) are listed in Section 2 of the attached report.

For non-conforming materials, the fabrication methods employed both in the shop and in the field by GGNS to minimize or mitigate IGSCC are described in Section 3 of the attached report.

Mitigation techniques were not implemented on certain welds in some large diameter piping sections in the recirculation system. The affected piping sections are discussed in FSAR section 5.2.3.5 and in Table 5.2-12. There are a total of twenty-two (22) non-mitigated welds in this category, all in recirculation

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system piping. The subject piping had been installed by the time that industry experience indicated even large diameter piping was susceptible to IGSCC.

For those welds in RCPB piping not yet mitigated, plans are being established that will implement mitigation techniques prior to startup following our first refueling outage. Techniques under consideration are induction heat stress improvement and last pass heat sink welding.

QUESTION 2: Provide a justification for operation with non-conforming materials in the reactor coolant pressure boundary.

RESPONSE: Justification for the operation of Grand Gulf prior to the first refueling outage, when the remaining susceptible welds will be mitigated, is based on the following information:

1. Crack Growth Rate Evaluation: This study was performed to determine if an undetected, pre-existing crack could grow to a critical flaw size in the time period between plant startup and the first refueling outage. The evaluation considered expected operating time and conditions, a circumferential crack geometry, a 5% initial flaw depth, and the worst-case stress and material information pertaining to the non-mitigated welds. The calculated flaw size after 22 months of operation was well below the ASME Section XI code allowable for wall thickness. The results of this conservative evaluation indicate crack growth leading to either leaks or pipe break is not expected prior to the first outage. (See Section 8 of the attached report.)
2. Leak Detection: The leak-before-break concept is also supported by the above evaluation as well as by historical evidence. While, no leakage due to IGSCC is expected to occur, Grand Gulf presently employs several methods of leak detection and monitoring in the drywell including parameters such as gaseous and particulate radioactivity, floor sump level, drywell ambient temperature and pressure, drywell air cooler performance, etc. Drywell leakage in excess of Technical Specification limits requires controlled shutdown and identification of the source of leakage. By virtue of the diversity of leakage detection systems and strict controls enforced by the Technical Specifications, there is adequate assurance that RCPB leakage will be detected and timely corrective action executed, i.e., controlled reactor shutdown to identify exact leakage source. (See Section 7 of the attached report.)
3. Summary: The diverse leakage detection capability and the conservative crack growth evaluation provide adequate justification for interim operation until the first refueling outage when proper mitigating techniques can be implemented on the subject welds.

QUESTION 3: Describe what preservice inspections have been accomplished which would serve as the baseline for further identification of IGSCC.

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RESPONSE: The baseline data for GGNS consist of Ultrasonic Examinations (UT) using procedures meeting the requirements of ASME Section XI. In addition to the UT, the ASME Section III radiographs for both field welds and shop welds are available for baseline data. Also, certain areas of weld inspection programs, as described in Section 4 of the attached report, will be enhanced and/or developed by MP&L at the first regularly scheduled refueling outage.

QUESTION 4: Describe what programs are to be implemented in water chemistry control to minimize or mitigate IGSCC.

RESPONSE: The most important primary system contaminants for IGSCC are oxygen and chlorides. The GGNS water chemistry program, established to monitor these contaminants in the primary system on periodic intervals are described in Section 6 of the attached report. The chloride concentration limits are set by GGNS Technical Specification 3.4.4. The oxygen concentration limits are established as procedural operational requirements. These limits are specified to prevent stress corrosion cracking in stainless steel. On-going research will determine if future enhancements (e.g., hydrogen injection) to the water chemistry program are required.

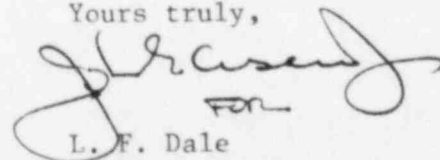
CONCLUSION:

For all the systems that make up the RCPB, only the recirculating water system contains materials which do not meet the selection requirements of NUREG 0313 Rev. 1. The only areas within the recirculating system susceptible to IGSCC are the heat affected zones of the non-mitigated welds. Based on the information provided herein and in the attached report, interim operation is considered justified to the first refueling outage, at which time mitigation techniques will be implemented. Also at that time, the inservice inspection program will include improved UT procedures and the augmented inspection program to address IGSCC will be developed and implemented.

The information contained in this submittal is in response to your letter dated July 27, 1983, and provides supplemental information and clarification of information presented in Chapter 5 of the GGNS FSAR. Appropriate portions of Chapter 5 will be revised to reflect the information presented in the attached report and will be included in the FSAR update in accordance with 10CFR50.71(e).

If you have any further questions regarding this matter, please call.

Yours truly,



L. F. Dale

Manager of Nuclear Services

JHS/JGC:rg
Attachment

cc: See next page

MISSISSIPPI POWER & LIGHT COMPANY

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
U. S. Nuclear Regulatory Commission
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Atlanta, Georgia 30303

BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

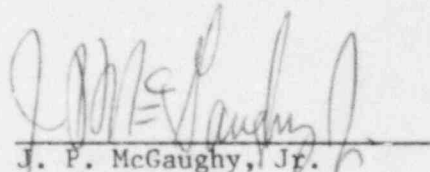
LICENSE NO. NPF-13

DOCKET NO. 50-416

IN THE MATTER OF
MISSISSIPPI POWER & LIGHT COMPANY
and
MIDDLE SOUTH ENERGY, INC.
and
SOUTH MISSISSIPPI ELECTRIC POWER ASSOCIATION

AFFIRMATION

I, J. P. McGaughy, Jr., being duly sworn, stated that I am Vice President - Nuclear of Mississippi Power & Light Company; that on behalf of Mississippi Power & Light Company, Middle South Energy, Inc., and South Mississippi Electric Power Association I am authorized by Mississippi Power & Light Company to sign and file with the Nuclear Regulatory Commission, this submittal in response to your request for information dated July 27, 1983; that I signed this application as 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 my knowledge, information and belief.

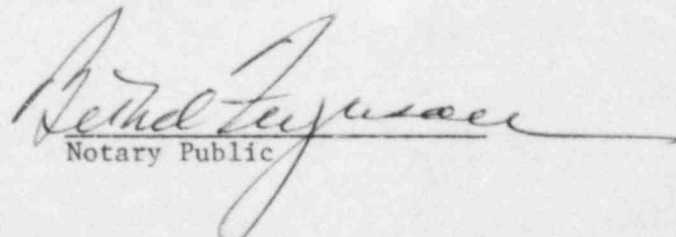


J. P. McGaughy, Jr.

STATE OF MISSISSIPPI
COUNTY OF HINDS

SUBSCRIBED AND SWORN TO before me, a Notary Public, in and for the County and State above named, this 17 day of August, 1983.

(SEAL)



Notary Public

My commission expires:

July 23, 1987