March 5, 1987

Docket No.: 50-416

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Mr. Oliver D. Kingsley, Jr.
Vice President, Nuclear Operations
System Energy Resources, Inc.
Post Office Box 23054
Jackson, Mississippi 39205

Dear Mr. Kingsley:

SUBJECT: CHANGES TO TECHNICAL SPECIFICATIONS REGARDING ROD PATTERN CONTROL SYSTEM AND REACTOR COOLANT IODINE SPIKES

RE: GRAND GULF NUCLEAR STATION, UNIT 1

The Commission has issued the enclosed Amendment No. 28 to Facility Operating License No. NPF-29 for the Grand Gulf Nuclear Station, Unit 1. This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated October 7, 1986 as revised December 5, 1986.

This amendment changes (1) the Technical Specifications for the rod pattern control system to allow bypassing of the rod controller function to properly position out-of-sequence control rods and (2) the Technical Specifications for reactor coolant iodine spikes by increasing the reporting interval, by eliminating the requirement to shutdown the plant if coolant iodine activity limits are exceeded for 800 hours in a 12-month interval and by clarifying iodine sampling requirements.

A copy of our Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Original Signed by

Lester L. Kintner, Project Manager
BWR Project Directorate No. 4
Division of BWR Licensing

Enclosures:
1. Amendment No. 28 to License No. NPF-29
2. Safety Evaluation

cc w/enclosures:
See next page

Previously concurred*:

w/ noted amendment revisions to amendment and SE, check STATE & SECY before issuance

PD#4/LA*	PD#4/PM*	OGC	PD#4/D*	
MO'Brien	LKintner:ca	Young	WButler	LB
02/12/87	02/12/87	2/20/87	02/18/87	3/3/87

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

March 5, 1987

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L. L. Kintner

Lester L. Kintner, Project Manager
BWR Project Directorate No. 4
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See next page

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Claiborne County Board of Supervisors
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MISSISSIPPI POWER & LIGHT COMPANY
SYSTEM ENERGY RESOURCES, INC.
SOUTH MISSISSIPPI ELECTRIC POWER ASSOCIATION
DOCKET NO. 50-416
GRAND GULF NUCLEAR STATION, UNIT 1
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 28
License No. NPF-29

1. The Nuclear Regulatory Commission (the Commission) has found that

   A. The application for amendment by Mississippi Power & Light Company, System Energy Resources, Inc. (formerly Middle South Energy, Inc.) and South Mississippi Electric Power Association, (the licensees) dated October 7, 1986 as revised December 5, 1986, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-29 is hereby amended to read as follows:

   Technical Specifications

   The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 28 , are hereby incorporated into this license. System Energy Resources, Inc. shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Original Signed by

Walter R. Butler, Director
BWR Project Directorate No. 4
Division of BWR Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 5, 1987

PD#4/LA	PD#4/PM	OGC	PD#4/D
MO'Brien	LKintner:ca	MYoung	WButler
2/12/87	02/12/87	2/20/87	2/18/87

3/2/87

3. This license amendment is effective as of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Walter R. Butler

Walter R. Butler, Director
BWR Project Directorate No. 4
Division of BWR Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 5, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 28

FACILITY OPERATING LICENSE NO. NPF-29

DOCKET NO. 50-416

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change. Overleaf page(s) provided to maintain document completeness.*

Remove	Insert
3/4 1-15	3/4 1-15*
3/4 1-16	3/4 1-16
-	3/4 1-16a
3/4 1-17	3/4 1-17
3/4 1-18	3/4 1-18*
3/4 4-15	3/4 4-15*
3/4 4-16	3/4 4-16
3/4 4-17	3/4 4-17
3/4 4-18	3/4 4-18
3/4 11-11	3/4 11-11
3/4 11-12	3/4 11-12*
B 3/4 1-3	B 3/4 1-3
B 3/4 1-4	B 3/4 1-4
-	B 3/4 1-4a
B 3/4 4-3	B 3/4 4-3
B 3/4 4-4	B 3/4 4-4
6-15	6-15*
6-16	6-16
-	6-16a

3/4.1.4 CONTROL ROD PROGRAM CONTROLS

CONTROL ROD WITHDRAWAL

LIMITING CONDITION FOR OPERATION

3.1.4.1 Control rods shall not be withdrawn.

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2, when the main turbine bypass valves are not fully closed and when THERMAL POWER is greater than the low power setpoint of the rod control and information system (RC & IS).

ACTION:

With any control rod withdrawn, when the main turbine bypass valves are not fully closed and THERMAL POWER is greater than the low power setpoint of the RC & IS, immediately return the control rod(s) to the position prior to control rod withdrawal.

SURVEILLANCE REQUIREMENTS

4.1.4.1 Control rod withdrawal shall be prevented when the main turbine bypass valves are not fully closed and THERMAL POWER is greater than the low power setpoint of the RC & IS, by a second licensed operator or other technically qualified member of the unit technical staff.

ROD PATTERN CONTROL SYSTEM

LIMITING CONDITION FOR OPERATION

3.1.4.2 The rod pattern control system (RPCS) shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2*#.

ACTION

a. With the RPCS inoperable or with the requirements of ACTION b, below, not satisfied and with:

   1. THERMAL POWER less than or equal to the Low Power Setpoint, control rod movement shall not be permitted, except by a scram.

   2. THERMAL POWER greater than the Low Power Setpoint, control rod withdrawal shall not be permitted.

b. OPERABLE control rod movement may continue by bypassing control rod(s) in the RPCS** provided that:

   1. With one control rod inoperable due to being immovable, as a result of excessive friction or mechanical interference, or known to be untrippable, this inoperable control rod may be bypassed in the rod action control system (RACS) provided that the SHUTDOWN MARGIN has been determined to be equal to or greater than required by Specification 3.1.1.

   2. With up to eight control rods inoperable for causes other than addressed in ACTION b.1, above, these inoperable control rods may be bypassed in the RACS provided that:

      a) The control rod(s) to be bypassed is inserted and the directional control valves are disarmed either:

         1) Electrically, or

         2) Hydraulically by closing the drive water and exhaust water isolation valves.

      b) All inoperable control rods are separated from all other inoperable control rods by at least two control cells in all directions.

      c) There are not more than 3 inoperable control rods in any RPCS group.

   3. Control rods may be bypassed in the Rod Action Control System (RACS) at any time. However, if THERMAL POWER is less than or equal to 20% of RATED THERMAL POWER:

*See Special Test Exception 3.10.2

#Entry into OPERATIONAL CONDITION 2 and withdrawal of selected control rods is permitted for the purpose of determining the OPERABILITY of the RPCS prior to withdrawal of control rods for the purpose of bringing the reactor to criticality.

**Bypassing control rod(s) in the RPCS shall be performed under administrative control.

LIMITING CONDITION FOR OPERATION (Continued)

a) All out-of-sequence and/or inoperable control rods must be separated from all other out-of-sequence and/or inoperable control rods by at least two control cells in all directions.

b) There may not be more than three out-of-sequence and/or inoperable control rods in any RPCS group.

c) Only one bypassed control rod may be moved at a time.

d) A maximum of 8 control rods may be bypassed and/or out of sequence at a time.

e) Control rods may not be bypassed and subsequently withdrawn past their in-sequence positions.

f) Any control rod found to be withdrawn past its in-sequence position must be inserted to or beyond its in-sequence position prior to subsequent control rod movement.

4. The position and bypassing and subsequent positioning of control rod(s) is verified by a second licensed operator or other technically qualified member of the unit technical staff.

SURVEILLANCE REQUIREMENTS

4.1.4.2 The RPCS shall be demonstrated OPERABLE by:

a. Verifying the OPERABILITY of the rod pattern controller function when THERMAL POWER is less than the low power setpoint by selecting and attempting to move an inhibited control rod:

1. After withdrawal of the first insequence control rod or gang for each reactor startup.

2. As soon as the rod inhibit mode is automatically initiated at the RPCS low power setpoint, 20 +15, -0% of RATED THERMAL POWER, during power reduction.

3. The first time only that a banked position, N1, N2, or N3, is reached during startup or during power reduction below the RPCS low power setpoint.

b. Verifying the OPERABILITY of the rod withdrawal limiter function when THERMAL POWER is greater than or equal to the low power setpoint by selecting and attempting to move a restricted control rod in excess of the allowable distance:

1. As each power range above the RPCS low power setpoint is entered during a power increase or decrease.

2. At least once per 31 days while operation continues within a given power range above the RPCS low power setpoint.

c. Verifying each RPCS bypass switch is in the unbypassed position or is in compliance with ACTION b.3 of this specification:

1. At least once per 24 hours.

2. Prior to a control rod movement, except by scram, following a power reduction to less than or equal to the low power setpoint.

REACTIVITY CONTROL SYSTEMS

3/4.1.5 STANDBY LIQUID CONTROL SYSTEM

LIMITING CONDITION FOR OPERATION

3.1.5 Two standby liquid control system subsystems shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2 and 5*.

ACTION:

a. In OPERATIONAL CONDITION 1 or 2:

1. With one system subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 7 days or be in at least HOT SHUTDOWN within the next 12 hours.

2. With both standby liquid control system subsystems inoperable, restore at least one subsystem to OPERABLE status within 8 hours or be in at least HOT SHUTDOWN within the next 12 hours.

b. In OPERATIONAL CONDITION 5*:

1. With one system subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 30 days or insert all insertable control rods within the next hour.

2. With both standby liquid control system subsystems inoperable, insert all insertable control rods within one hour.

SURVEILLANCE REQUIREMENTS

4.1.5 Each standby liquid control system subsystem shall be demonstrated OPERABLE:

a. At least once per 24 hours by verifying that;

1. The temperature of the sodium pentaborate solution is within the limits of Figure 3.1.5-1.

2. The available volume of sodium pentaborate solution is greater than or equal to 4587 gallons.

3. The heat tracing circuit is OPERABLE by determining the temperature of the pump suction piping to be greater than or equal to 70°F.

*With any control rod withdrawn. Not applicable to control rods removed per Specification 3.9.10.1 or 3.9.10.2.

TABLE 3.4.4-1

REACTOR COOLANT SYSTEM
CHEMISTRY LIMITS

OPERATIONAL CONDITION	CHLORIDES	CONDUCTIVITY (μmhos/cm @25°C)	PH
1	$\leq$ 0.2 ppm	$\leq$ 1.0	$5.6 \leq pH \leq 8.6$
2 and 3	$\leq$ 0.1 ppm	$\leq$ 2.0	$5.6 \leq pH \leq 8.6$
At all other times	$\leq$ 0.5 ppm	$\leq$ 10.0	$5.3 \leq pH \leq 8.6$

3/4.4.5 SPECIFIC ACTIVITY

LIMITING CONDITION FOR OPERATION

3.4.5 The specific activity of the primary coolant shall be limited to:

a. Less than or equal to 0.2 microcuries per gram DOSE EQUIVALENT I-131, and

b. Less than or equal to $100/\bar{E}$ microcuries per gram.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3 and 4.

ACTION:

a. In OPERATIONAL CONDITIONS 1, 2 or 3 with the specific activity of the primary coolant;

1. Greater than 0.2 microcuries per gram DOSE EQUIVALENT I-131 but less than or equal to 4.0 microcuries per gram DOSE EQUIVALENT I-131 for more than 48 hours during one continuous time interval or greater than 4.0 microcuries per gram DOSE EQUIVALENT I-131, be in at least HOT SHUTDOWN with the main steamline isolation valves closed within 12 hours.

2. Greater than $100/\bar{E}$ microcuries per gram, be in at least HOT SHUTDOWN with the main steamline isolation valves closed within 12 hours.

b. In OPERATIONAL CONDITIONS 1, 2, 3 or 4, with the specific activity of the primary coolant greater than 0.2 microcuries per gram DOSE EQUIVALENT I-131 or greater than $100/\bar{E}$ microcuries per gram, perform the sampling and analysis requirements of Item 4a of Table 4.4.5-1 until the specific activity of the primary coolant is restored to within its limit.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION (Continued)

c. In OPERATIONAL CONDITION 1 or 2, with:

1. THERMAL POWER changed by more than 15% of RATED THERMAL POWER in one hour*, or

2. The off-gas level, at the SJAE, increased by more than 10,000 microcuries per second in one hour during steady state operation at release rates less than 75,000 microcuries per second, or

3. The off-gas level, at the SJAE, increased by more than 15% in one hour during steady state operation at release rates greater than 75,000 microcuries per second,

perform the sampling and analysis requirements of Item 4b of Table 4.4.5-1 until the specific activity of the primary coolant is restored to within its limit.

SURVEILLANCE REQUIREMENTS

4.4.5 The specific activity of the reactor coolant shall be demonstrated to be within the limits by performance of the sampling and analysis program of Table 4.4.5-1.

*Not applicable during the startup test program.

TABLE 4.4.5-1

PRIMARY COOLANT SPECIFIC ACTIVITY SAMPLE AND ANALYSIS PROGRAM

TYPE OF MEASUREMENT AND ANALYSIS	SAMPLE AND ANALYSIS FREQUENCY	OPERATIONAL CONDITIONS IN WHICH SAMPLE AND ANALYSIS REQUIRED
1. Gross Beta and Gamma Activity Determination	At least once per 72 hours	1, 2, 3
2. Isotopic Analysis for DOSE EQUIVALENT I-131 Concentration	At least once per 31 days	1
3. Radiochemical for $\bar{E}$ Determination	At least once per 6 months*	1
4. Isotopic Analysis for Iodine	a) At least once per 4 hours, whenever the specific activity exceeds a limit, as required by ACTION b.	1#, 2#, 3#, 4#
	b) At least one sample, between 2 and 6 hours following the change in THERMAL POWER or off-gas level, whenever the specific activity exceeds a limit, as required by ACTION c.	1, 2
5. Isotopic Analysis of an Off-gas Sample Including Quantitative Measurements for at least Xe-133, Xe-135 and Kr-88	At least once per 31 days	1

*Sample to be taken after a minimum of 2 EFPD and 20 days of POWER OPERATION have elapsed since reactor was last subcritical for 48 hours or longer.
#Until the specific activity of the primary coolant system is restored to within its limits.

TABLE 4.11.2.1.2-1 (Continued)

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

TABLE NOTATION (Continued)

b. Analyses shall also be performed following startup from cold shutdown, or a THERMAL POWER change exceeding 15 percent of the RATED THERMAL POWER within a one hour period. This requirement does not apply if (1) routine analysis required by Table 4.4.5-1 shows that the DOSE EQUIVALENT I-131 concentration in the primary coolant has not increased more than a factor of 3; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

c. Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing or after removal from sampler. Sampling and analyses shall also be performed at least once per 24 hours for at least 7 days following each shutdown, startup or THERMAL POWER change exceeding 15 percent of RATED THERMAL POWER in one hour. When samples collected for 24 hours are analyzed, the corresponding LLD's may be increased by a factor of 10. This requirement does not apply if (1) routine analysis required by Table 4.4.5-1 shows that the DOSE EQUIVALENT I-131 concentration in the primary coolant has not increased more than a factor of 3; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

d. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Specifications 3.11.2.1 and 3.11.2.3.

e. The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for gaseous emissions and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144 for particulate emissions. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported.

RADIOACTIVE EFFLUENTS

DOSE - NOBLE GASES

LIMITING CONDITION FOR OPERATION

3.11.2.2 The air dose due to noble gases released in gaseous effluents, from each reactor unit, from the site to areas at and beyond the SITE BOUNDARY (see Figure 5.1.3-1) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation, and

b. During any calendar year: Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

APPLICABILITY: At all times.

ACTION:

a. With the calculated air dose from the radioactive noble gases in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report which identifies the cause(s) for exceeding the limit(s) and defines the corrective actions to be taken to ensure that future releases will be in compliance with Specification 3.11.2.2.

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.2 Dose Calculations. Cumulative dose contributions for noble gases for the current calendar quarter and current calendar year shall be determined in accordance with the methodology and parameters in the ODCM at least once per 31 days.

CONTROL RODS (Continued)

Control rod coupling integrity is required to ensure compliance with the analysis of the rod drop accident in the FSAR. The overtravel position feature provides the only positive means of determining that a rod is properly coupled and therefore this check must be performed prior to achieving criticality after completing CORE ALTERATIONS that could have affected the control rod coupling integrity. The subsequent check is performed as a backup to the initial demonstration.

In order to ensure that the control rod patterns can be followed and therefore that other parameters are within their limits, the control rod position indication system must be OPERABLE.

The control rod housing support restricts the outward movement of a control rod to less than 3 inches in the event of a housing failure. The amount of rod reactivity which could be added by this small amount of rod withdrawal is less than a normal withdrawal increment and will not contribute to any damage to the primary coolant system. The support is not required when there is no pressure to act as a driving force to rapidly eject a drive housing.

The required surveillance intervals are adequate to determine that the rods are OPERABLE and not so frequent as to cause excessive wear on the system components.

3/4.1.4 CONTROL ROD PROGRAM CONTROLS

The rod withdrawal limiter system input power signal orginates from the first stage turbine pressure. When operating with the steam bypass valves open, this signal indicates a core power level which is less than the true core power. Consequently, near the low power setpoint and high power setpoint of the rod pattern control system, the potential exists for nonconservative control rod withdrawals. Therefore, when operating at a sufficiently high power level, there is a small probability of violating fuel Safety Limits during a licensing basis rod withdrawal error transient. To ensure that fuel Safety Limits are not violated, this specification prohibits control rod withdrawal when a biased power signal exists and core power exceeds the specified level.

Control rod withdrawal and insertion sequences are established to assure that the maximum insequence individual control rod or control rod segments which are withdrawn at any time during the fuel cycle could not be worth enough to result in a peak fuel enthalpy greater than 280 cal/gm in the event of a control rod drop accident. The specified sequences are characterized by homogeneous, scattered patterns of control rod withdrawal. When THERMAL POWER is greater than 20% of RATED THERMAL POWER, there is no possible rod worth which, if dropped at the design rate of the velocity limiter, could result in a peak enthalpy of 280 cal/gm. Thus requiring the rod pattern controller function to be OPERABLE when THERMAL POWER is less than or equal to 20% of RATED THERMAL POWER provides adequate control.

CONTROL ROD PROGRAM CONTROLS (Continued)

The RPCS provides automatic supervision to assure that out-of-sequence rods will not be withdrawn or inserted. A rod is out of sequence if it does not meet the criteria of the Banked Position Withdrawal Sequence as described in the FSAR. The RPCS function is allowed to be bypassed in the Rod Action Control System (RACS) if necessary, for example, to insert an inoperable control rod, return an out-of-sequence control rod to the proper in-sequence position or move an in-sequence control rod to another in-sequence position. The requirement that a second qualified individual verify such bypassing and positioning of control rods ensures that the bases for RPCS limitations are not exceeded. In addition, if THERMAL POWER is below the low power setpoint, additional restrictions are provided when bypassing control rods to ensure operation at all times within the basis of the control rod drop accident analysis.

The analysis of the rod drop accident is presented in Section 15.4 of the FSAR and the techniques of the analysis are presented in a topical report, Reference 1, and two supplements, References 2 and 3.

The RPCS is also designed to automatically prevent fuel damage in the event of erroneous rod withdrawal from locations of high power density during higher power operation.

A dual channel system is provided that, above the low power setpoint, restricts the withdrawal distances of all non-peripheral control rods. This restriction is greatest at highest power levels.

3/4.1.5 STANDBY LIQUID CONTROL SYSTEM

The standby liquid control system provides a backup capability for bringing the reactor from full power to a cold, xenon-free shutdown, assuming that the withdrawn control rods remain fixed in the rated power pattern. To meet this objective it is necessary to inject a quantity of boron which produces a concentration of 660 ppm in the reactor core in approximately 90 to 120 minutes. A minimum available quantity of 4587 gallons of sodium pentaborate solution containing a minimum of 5500 lbs. of sodium pentaborate is required to meet a shutdown requirement of 3%. There is an additional allowance of 165 ppm in the reactor core to account for imperfect mixing and the filling of other piping systems connected to the reactor vessel. The time requirement was selected to override the reactivity insertion rate due to cooldown following the xenon poison peak and the required pumping rate is 41.2 gpm. The minimum storage volume of the solution is established to allow for the portion below the pump suction that cannot be inserted. The temperature requirement is necessary to ensure that the sodium pentaborate remains in solution.

1. C. J. Paone, R. C. Stirn and J. A. Woolley, "Rod Drop Accident Analysis for Large BWR's," G. E. Topical Report NEDO-10527, March 1972

2. C. J. Paone, R. C. Stirn and R. M. Young, Supplement 1 to NEDO-10527, July 1972

3. J. M. Haun, C. J. Paone and R. C. Stirn, Addendum 2, "Exposed Cores," Supplement 2 to NEDO-10527, January 1973

STANDBY LIQUID CONTROL SYSTEM (Continued)

With redundant pumps and explosive injection valves and with a highly reliable control rod scram system, operation of the reactor is permitted to continue for short periods of time with the system inoperable or for longer periods of time with one of the redundant components inoperable.

Surveillance requirements are established on a frequency that assures a high reliability of the system. Once the solution is established, boron concentration will not vary unless more boron or water is added, thus a check on the temperature and volume once each 24 hours assures that the solution is available for use.

Replacement of the explosive charges in the valves at regular intervals will assure that these valves will not fail because of deterioration of the charges.

3/4.4.4 CHEMISTRY

The water chemistry limits of the reactor coolant system are established to prevent damage to the reactor materials in contact with the coolant. Chloride limits are specified to prevent stress corrosion cracking of the stainless steel. The effect of chloride is not as great when the oxygen concentration in the coolant is low, thus the 0.2 ppm limit on chlorides is permitted during POWER OPERATION. During shutdown and refueling operations, the temperature necessary for stress corrosion to occur is not present so a 0.5 ppm concentration of chlorides is not considered harmful during these periods.

Conductivity measurements are required on a continuous basis since changes in this parameter are an indication of abnormal conditions. When the conductivity is within limits, the pH, chlorides and other impurities affecting conductivity must also be within their acceptable limits. With the conductivity meter inoperable, additional samples must be analyzed to ensure that the chlorides are not exceeding the limits.

The surveillance requirements provide adequate assurance that concentrations in excess of the limits will be detected in sufficient time to take corrective action.

3/4.4.5 SPECIFIC ACTIVITY

The limitations on the specific activity of the primary coolant ensure that the 2 hour thyroid and whole body doses resulting from a main steam line failure outside the containment during steady state operation will not exceed small fractions of the dose guidelines of 10 CFR 100. The values for the limits on specific activity represent interim limits based upon a parametric evaluation by the NRC of typical site locations. These values are conservative in that specific site parameters, such as site boundary location and meteorological conditions, were not considered in this evaluation.

The ACTION statement permitting POWER OPERATION to continue for limited time periods with the primary coolant's specific activity greater than 0.2 microcuries per gram DOSE EQUIVALENT I-131, but less than or equal to 4.0 microcuries per gram DOSE EQUIVALENT I-131, accommodates possible iodine spiking phenomenon which may occur following changes in THERMAL POWER. Operation with specific activity levels exceeding 0.2 microcuries per gram DOSE EQUIVALENT I-131 but less than or equal to 4.0 microcuries per gram DOSE EQUIVALENT I-131 are restricted to no more than 48 consecutive hours.

Information obtained on iodine spiking will be used to assess the parameters associated with spiking phenomena. A reduction in frequency of isotopic analysis following power changes may be permissible if justified by the data obtained.

Closing the main steam line isolation valves prevents the release of activity to the environs should a steam line rupture occur outside containment.

3/4.4.5 SPECIFIC ACTIVITY (Continued)

The surveillance requirements provide adequate assurance that excessive specific activity levels in the reactor coolant will be detected in sufficient time to take corrective action.

3/4.4.6 PRESSURE/TEMPERATURE LIMITS

All components in the reactor coolant system are designed to withstand the effects of cyclic loads due to system temperature and pressure changes. These cyclic loads are introduced by normal load transients, reactor trips, and startup and shutdown operations. The various categories of load cycles used for design purposes are provided in Section 3.9 of the FSAR. During startup and shutdown, the rates of temperature and pressure changes are limited so that the maximum specified heatup and cooldown rates are consistent with the design assumptions and satisfy the stress limits for cyclic operation.

During heatup, the thermal gradients in the reactor vessel wall produce thermal stresses which vary from compressive at the inner wall to tensile at the outer wall. These thermal induced compressive stresses tend to alleviate the tensile stresses induced by the internal pressure. Therefore, a pressure-temperature curve based on steady state conditions, i.e., no thermal stresses, represents a lower bound of all similar curves for finite heatup rates when the inner wall of the vessel is treated as the governing location.

The heatup analysis also covers the determination of pressure-temperature limitations for the case in which the outer wall of the vessel becomes the controlling location. The thermal gradients established during heatup produce tensile stresses which are already present. The thermal induced stresses at the outer wall of the vessel are tensile and are dependent on both the rate of heatup and the time along the heatup ramp; therefore, a lower bound curve similar to that described for the heatup of the inner wall cannot be defined. Subsequently, for the cases in which the outer wall of the vessel becomes the stress controlling location, each heatup rate of interest must be analyzed on an individual basis.

The reactor vessel materials have been tested to determine their initial RT_{NDT}. The RT_{NDT} for welds and base material in the closure flange region is $< 10°F$. The initial hydrostatic test pressure was 1563 psig. The results of these tests are shown in Table B 3/4.4.6-1. Reactor operation and resultant fast neutron, E greater than 1 Mev, irradiation will cause an increase in the RT_{NDT}. Therefore, an adjusted reference temperature, based upon the fluence, phosphorus content and copper content of the material in question, can be predicted using Bases Figure B 3/4.4.6-1 and the recommendations of Regulatory Guide 1.99, Revision 1, "Effects of Residual Elements on Predicted Radiation Damage to Reactor Vessel Materials." The pressure/temperature limit curve, Figure 3.4.6.1-1, curves A', B' and C', includes predicted adjustments for this shift in RT_{NDT} for the end of life fluence as well as adjustments for possible errors in the pressure and temperature sensing instruments. Curves B' and C' are coincident with curves B and C, respectively.

PROCEDURES AND PROGRAMS (Continued)

6. Feedwater leakage control system.
7. Post-accident sampling system.
8. Suppression pool level detection portion of the suppression pool makeup system.

The program shall include the following:

1. Preventive maintenance and periodic visual inspection requirements, and
2. Integrated leak test requirements for each system at refueling cycle intervals or less.

b. In-Plant Radiation Monitoring

A program which will ensure the capability to accurately determine the airborne iodine concentration in vital areas under accident conditions. This program shall include the following:

1. Training of personnel,
2. Procedures for monitoring, and
3. Provisions for maintenance of sampling and analysis equipment.

c. Post-accident Sampling

A program which will ensure the capability to obtain and analyze reactor coolant, radioactive iodines and particulates in plant gaseous effluents, and containment atmosphere samples under accident conditions. The program shall include the following:

1. Training of personnel,
2. Procedures for sampling and analysis,
3. Provisions for maintenance of sampling and analysis equipment.

6.9 REPORTING REQUIREMENTS

ROUTINE REPORTS

6.9.1 In addition to the applicable reporting requirements of Title 10, Code of Federal Regulations, the following reports shall be submitted to the Regional Administrator of the Regional Office, unless otherwise noted.

STARTUP REPORTS

6.9.1.1 A summary report of plant startup and power escalation testing shall be submitted following (1) receipt of an operating license, (2) amendment to the license involving a planned increase in power level, (3) installation of fuel that has a different design or has been manufactured by a different fuel supplier, and (4) modifications that may have significantly altered the nuclear, thermal, or hydraulic performance of the unit.

STARTUP REPORTS (Continued)

6.9.1.2 The startup report shall address each of the tests identified in the FSAR and shall include a description of the measured values of the operating conditions or characteristics obtained during the test program and a comparison of these values with design predictions and specifications. Any corrective actions that were required to obtain satisfactory operation shall also be described. Any additional specific details required in license conditions based on other commitments shall be included in this report.

6.9.1.3 Startup reports shall be submitted within (1) 90 days following completion of the startup test program, (2) 90 days following resumption or commencement of commercial power operation, or (3) 9 months following initial criticality, whichever is earliest. If the Startup Report does not cover all three events, i.e., initial criticality, completion of startup test program, and resumption or commencement of commercial operation, supplementary reports shall be submitted at least every three months until all three events have been completed.

ANNUAL REPORTS[1/]

6.9.1.4 Annual reports covering the activities of the unit as described below for the previous calendar year shall be submitted prior to March 1 of each year. The initial report shall be submitted prior to March 1 of the year following initial criticality.

6.9.1.5 Reports shall include a tabulation on an annual basis of the number of station, utility, and other personnel, including contractors, receiving exposures greater than 100 mrem/yr and their associated manrem exposure according to work and job functions,[2/] e.g., reactor operations and surveillance, inservice inspection, routine maintenance, special maintenance (describe maintenance), waste processing, and refueling. The dose assignments to various duty functions may be estimated based on pocket dosimeter, TLD, or film badge measurements. Small exposures totalling less than 20 percent of the individual total dose need not be accounted for. In the aggregate, at least 80 percent of the total whole body dose received from external sources should be assigned to specific major work functions.

6.9.1.6 Reports shall include documentation of all challenges to safety and relief valves.

6.9.1.7 Reports shall include the results of specific activity analyses in which the primary coolant exceeded the limits of Specification 3.4.5. The following information shall be included: (1) reactor power history starting 48 hours prior to the first sample in which the limit was exceeded; (2) results of the last isotopic analysis for radioiodine performed prior to exceeding the limit, results of analysis while the limit was exceeded, and results of one analysis after the radioiodine activity was reduced to less than the limit

[1/] A single submittal may be made for a multiple unit station. The submittal should combine those sections that are common to all units at the station.

[2/] This tabulation supplements the requirements of §20.407 of 10 CFR Part 20.

ANNUAL REPORTS (Continued)

with each result including date and time of sampling and the radioiodine concentrations; (3) cleanup system flow history starting 48 hours prior to the first sample in which the limit was exceeded; (4) graph of the I-131 concentration and one other radioiodine isotope concentration in microcuries per gram as a function of time for the duration of the specific activity above the steady-state level; and (5) the time duration when the specific activity of the primary coolant exceeded the radioiodine limit.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 28 TO FACILITY OPERATING LICENSE NO. NPF-29

MISSISSIPPI POWER & LIGHT COMPANY

SYSTEM ENERGY RESOURCES, INC.

SOUTH MISSISSIPPI ELECTRIC POWER ASSOCIATION

GRAND GULF NUCLEAR STATION, UNIT 1

DOCKET NO. 50-416

1.0 INTRODUCTION

By letter dated October 7, 1986, as revised December 5, 1986, Mississippi Power & Light Company (the licensee)* requested an amendment to Facility Operating License No. NPF-29 for the Grand Gulf Nuclear Station, Unit 1 (GGNS-1). The proposed amendment would change the Technical Specifications (TSs) in two areas: (1) change TS 3/4.1.4.2, "Rod Pattern Control System," and associated Bases 3/4.1.4 to specify conditions for which rod pattern controller function of the rod pattern control system (RPCS) may be bypassed for the purpose of properly positioning out-of-sequence control rods; and, (2) change TS 3/4.4.5, "Specific Activity," associated Bases 3/4.4.5, Table 4.11.2.1.2-1, "Radioactive Gaseous Waste Sampling and Analysis Program," and TS 6.9, "Reporting Requirements," to eliminate an action statement which requires reactor shutdown if reactor coolant radioactive iodine transients (iodine spikes) occur over a cumulative operating time greater than 800 hours in a 12-month interval and to change requirements for reporting specific activities that exceed the radioiodine activity limit from 30-day special reports to the annual report required by TS 6.9.1. These two changes are considered separately in the following evaluation.

.0 EVALUATION

.1 Bypassing of Rod Pattern Control System (RPCS)

The proposed changes to the Technical Specifications relate to limits and requirements for bypassing of control rods within the rod pattern control system. The proposed changes were prompted largely by a NRC inspection Notice of Violation for GGNS-1 concerning procedures to be followed for control rod pattern control when reducing reactor power to and below the low power alarm point (LPAP). For operation below the LPAP rod pattern control is necessary to assure consistency with the (low power) Rod Drop

* On December 20, 1986, the Commission issued License Amendment No. 27 which authorized the transfer of the control and performance of licensed activities from Mississippi Power & Light Company to System Energy Resources, Inc. (SERI). "The licensee" refers to Mississippi Power & Light Company before December 20, 1986 and to SERI on or after December 20, 1986.

Accident Analysis rod pattern assumptions. In particular, Inspection Report No. 50-416/86-06* (unresolved item UNR 416/86-06-02) noted that the Technical Specifications did not address the use of bypass switches as used at GGNS-1 to realign out-of-sequence (misaligned) rods after entering the low power region. The proposed changes are primarily intended to provide such guidance in the RPCS Technical Specifications.

Except for some minor editorial changes, the proposed changes to TS 3/4.1.4.2 are additions to (1) the Action Statements (new section 3.a through 3.f, with the existing section 3 redesignated 4) providing restrictions for bypassing control rods other than the inoperable rods presently in the specification, (2) Surveillance Requirements (new section c.1 and c.2) providing requirements for the surveillance of bypass switches, and (3) an insertion in the Bases providing a definition of out-of-sequence and a discussion of bypassing of rods.

TS 3.1.4.2 already addresses the bypass of "untripable" rods and rods inoperable for causes other than untripable. The latter may be bypassed if fully inserted and associated control valves are disarmed. Eight of these inoperable rods may be bypassed but must be separated from each other by at least two control cells and there may be no more than 3 such rods in a RPCS group.

The proposed addition to the action statement addresses the bypassing of rods which are not necessarily inoperable. It is intended primarily for rods which are out-of-sequence (misaligned) so that they can be moved to their correct in-sequence position. In particular this includes going below the LPAP with a Banked Position Withdrawal Sequence pattern not fully established. It thus addresses UNR 416/86-06-02.

Similar to the specification for inoperable rods, the proposed addition for out-of-sequence rods would allow (1) only 8 rods to be out-of-sequence or bypassed (either because they are inoperable or out-of-sequence), (2) not more than 3 out-of-sequence or inoperable rods in a RPCS group, and (3) a minimum separation of out-of-sequence or inoperable rods of not less than 2 control cells. Only one bypassed rod can be moved at a time. In addition, bypassed rods may not be withdrawn past their in-sequence position and any rod found to be past its in-sequence position must be appropriately inserted before any other rod movement. The existing required "second operator" verification of bypassing and positioning of rods also applies to this proposed action item.

This addition to the specification allows only a limited number (8) of rods to be out-of-sequence or bypassed and otherwise permits rod motion only by scram when this is exceeded below the LPAP. It provides for appropriate spatial separation of these rods to minimize interactions. It prohibits rods from being withdrawn past in-sequence locations and requires rods which are beyond this limit (e.g., during power decrease past LPAP) to be inserted prior to other movements. It requires second operator

* Inspection Report No. 50-416/86-06 transmitted by letter from Roger D. Walker (NRC) to Oliver D. Kingsley, Jr., Mississippi Power & Light Co., April 10, 1986.

verification. It thus permits the realignment of a limited number of out-of-sequence rods and provides suitable restrictions for these bypasses. It should be noted, however, that procedures used for realignment of rods withdrawn beyond in-sequence positions should be compatible with Banked Position Withdrawal Sequence banked patterns. The bypass has no effect on the rod block function in the power range. This limited use of bypass switches to realign a few rods is acceptable. Its use should be minimal since normal procedures should generally prevent misalignment such as occurred in the violation precipitating this change. GGNS-1 operating procedures relating to the violation have been subsequently modified to provide guidance on verification that the rod pattern conforms to RPCS constraints before decreasing power below the low power alarm point.

The proposed change to the surveillance requirements adds a section (4.1.4.2c) on bypass switch surveillance, a subject not previously addressed. It requires verification that each bypass switch is in the unbypassed position (except for those involved in the previously discussed action statement) at least every 24 hours and prior to rod movement when power is reduced below the LPAP. This is a reasonable schedule for such checks and is an acceptable addition to the surveillance requirements.

The addition to the Bases 3/4.1.4 provides a definition of out-of-sequence and discusses the conditions under which a rod might be bypassed and the requirement for a second operator for monitoring the bypass and subsequent related rod movement. It is an acceptable discussion of the subject.

There are also minor related editorial changes to the specification (Action Statement b., Surveillance Requirements a and b and Bases). These are acceptable.

In summary, the staff has reviewed the information submitted by the licensee for proposed changes to the Technical Specifications relating to RPCS rod bypass operations. Based on this review the staff concludes that appropriate material was submitted and that the proposed changes satisfy staff positions and requirements in these areas. Operations in the proposed manner and in accordance with the proposed Technical Specifications are acceptable. These changes provide an acceptable resolution of UNR 416/86-06-02 in Inspection Report No. 50-416/86-06.

2.2 Iodine Spikes in Reactor Coolant

The Technical Specifications for GGNS-1 currently require that the licensee report to the NRC within 30 days any iodine spiking events. Furthermore, plant shutdown is required if within any 12-month period, cumulative operating time with an iodine activity level above 0.2 micro curies per gram reaches 800 hours.

Generic Letter No. 85-19, "Reporting Requirements on Primary Coolant Iodine Spikes" provides relaxation of the above requirements to the

effect that the reporting requirements for the iodine spiking can be reduced from a short-term report (within 30 days) to an item which is to be included in the annual report required by TS 6.9.1. Additionally, the Generic Letter No. 85-19 states that the existing requirements to shutdown a plant if iodine activity limits are exceeded for 800 hours in a 12-month period can be eliminated. The basis for these changes is that the quality of nuclear fuel has been greatly improved over the past decade with the result that normal coolant iodine activity (i.e., in the absence of iodine spiking) is well below the limit. Appropriate actions would be initiated long before accumulating 800 hours above the iodine activity limit. In addition, 10 CFR 50.72(b)(1)(ii) requires the NRC to be immediately notified of fuel cladding failures that exceed expected values or that are caused by unexpected factors. Therefore, this Technical Specification limit is no longer considered necessary on the basis that proper fuel management by licensees and existing reporting requirements should preclude ever approaching the limit.

The text of the proposed changes to the action statements of TS 3.4.5 and reporting requirements of TS 6.9.1 is identical with the "Model Technical Specifications showing revisions to STS Reporting Requirements for Primary Coolant Specific Activity" (which are a part of the Generic Letter No. 85-19), and therefore, the proposed changes are acceptable.

The change to the Bases 3/4.4.5 deletes the discussion regarding the 800 hour per year operating restriction. The change to the Bases is acceptable.

Changes to TS Table 4.4.5-1 and TS Table 4.11.2.1.2-1 clarify iodine sampling requirements but do not change the requirements. These changes are acceptable.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance and reporting requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and c(10). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

4.0 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (51 FR 47082) on December 30, 1986, and consulted with the state of Mississippi. No public comments were received, and the state of Mississippi did not have any comments.

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and the security nor to the health and safety of the public.

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