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Docket No. 50-[illegible]
License No. NPF-[illegible]

Entergy Operations, Inc.
ATTN: Mr. W. T. Cottle, Vice President
Nuclear Operations - Grand Gulf
P. O. Box 756
Port Gibson, MS 39150

Gentlemen:

SUBJECT: GRAND GULF EMERGENCY PLAN, REVISION 22 (DATED JUNE 27, 1991) AND CHANGE NO. 22-001-91 (DATED OCTOBER 3, 1991), DOCKET NO. 50-416

As you know, in early 1991 the NRC requested your commitment to restore the Grand Gulf emergency action level (EAL) scheme to the Emergency Plan. Your staff committed to the accomplishment of this restoration via issuance of an appropriate revision to the Emergency Plan by June 30, 1991. Your submittal of Revision 22 fulfilled that commitment.

When Revision 11 to the Emergency Plan was issued in August 1985, the detailed criteria of the EALs were deleted and replaced by a reference to the applicable implementing procedure for emergency classification (viz., Emergency Plan Procedure 10-S-01-1). This methodology was approved by the NRC at that time. However, the NRC subsequently determined that this approach did not provide for an appropriate level of formal review and oversight of changes to the EALs. We appreciate your cooperation in restoring the EALs to your Emergency Plan.

Because of the large number of EAL changes made since 1985 outside the NRC's formal purview, we did not attempt to compare the EALs from Revision 22 to those in Revision 10, but instead considered the EAL scheme in Table 4-1 to be new for purposes of this review. We have therefore analyzed your current classification scheme against regulatory guidance as well as established industry standards and practices. Our review has identified a number of deficiencies (listed in Enclosure 1) and potential areas for improvement (listed in Enclosure 2). A "deficiency" in this context refers to an incomplete, nonconservative, or inappropriate EAL relative to NRC guidance and accepted industry standards. We request that you respond in writing within 45 days of the date of this letter, providing either (a) a proposed corrective action (or justification for inaction, if appropriate) for each of the deficiencies, or (b) an approved revision to the Emergency Plan which adequately addresses the deficiencies. The potential areas for EAL improvement listed in Enclosure 2 are for your consideration in future Plan revisions and do not require a response.

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Our review of Change No. 22-001-91 to the Emergency Plan determined that the modifications therein meet the planning standards of 10 CFR 50.47(b) and the requirements of Appendix E to 10 CFR Part 50.

Please be reminded that 10 CFR 50.54(q) requires that proposed changes which decrease the effectiveness of your Emergency Plan shall not be implemented without application to and approval by the NRC. However, changes may be made without NRC approval if such changes do not decrease the effectiveness of the Plan, and if the revised Plan continues to meet the standards of 10 CFR 50.47(b) and the requirements of Appendix E to 10 CFR 50. If a change is made without aporoval, you should furnish copies in accordance with 10 CFR 50.54(q). In addition, any changes to your Emergency Plan implementing Procedures should be made in accordance with the requriements of APpendix E to 10 CFR Part 50.

Should you have any questions reagarding this letter, please contact Mr. William E. Rankin of my staff on 4043315618.

Sincerely,

ORIGINAL SIGNED
BY
W. E. CLINE

William E. Cline, Chief
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Enclosures:
1. Deficiencies in Grand Gulf EALs
2. Potential Areas for Improvement in Grand Gulf EALs

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3/25/92	3/26/92	3/26/92	3/26/92

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ENCLOSURE 1

DEFICIENCIES IN GRAND GULF EMERGENCY ACTION LEVELS

The following discussion makes reference to the initiating conditions (ICs) and corresponding emergency action levels (EALs) found in Table 4-1, "Summary of Emergency Action Levels," of the licensee's Emergency Plan (Revision 22), and relates the EALs to the four standard emergency classes that comprise the classification system: Unusual Event (UE), Alert, Site Area Emergency (SAE), and General Emergency (GE).

1. UE IC #6: The EAL for this IC is predicated upon failure of a safety or relief valve to close following a manual scram initiated due to a stuck-open relief valve required by Technical Specification 3.4.2.1. This IC was intended by NRC guidance to be anticipatory to other more serious conditions, such as a primary leak greater than 50 gpm. Thus it is inappropriate to limit the EAL to only the situation following a manual scram.

2. Alert IC #8: This IC states, "Failure of the reactor protection system [RPS] to initiate and complete a scram which brings the reactor subcritical." The significance of this IC is that the RPS failed to scram the plant, subsequent manual attempts to scram were successful, and no further power generation occurred. The rationale for designating this an Alert is that the RPS was called on to scram and the fuel or Reactor Coolant System (RCS) integrity was challenged (i.e., one fission product barrier). However, with continued power generation (as indicated in the licensee's EAL), an Anticipated Transient Without Scram (ATWS) should result in a Site Area Emergency because both the fuel and the RCS integrity are challenged. As written, the EAL threshold is too high because it associates an Alert classification with an unsuccessful manual scram and some continued power generation. This is inconsistent with the anticipatory intent of the IC.

3. Alert IC #9: The conservative intent of this IC regarding a fuel-damage accident is to "capture" a release to the containment or fuel handling building, not necessarily to the environment. With that conservatism in mind, not under all circumstances will EAL #1 ("Notification of a spent fuel damaging accident") necessarily be a precursor to a fuel damaging accident. For example, an accident involving loss of spent fuel pool level may result in fuel damage which may not be readily observed. Thus the first EAL, as a necessary condition, is inappropriately restrictive. EAL #3 ("Summation of all releases exceeds 10 times TS limit") is the same as Alert IC #12, and is therefore covered separately. When added to EALs #1 and 2, EAL #3 becomes an unnecessary, nonconservative restriction on the declaration

(all three items must be "yes" to meet the EAL criteria). For example, if EAL #2.a ("High high radiation alarms on ... fuel handling vent exhaust") is observed and confirmed by an area monitor or other supporting indicator, the Alert declaration should be made. In addition, area monitors should be considered as symptomatic indicators of fuel damage. The licensee should correct the identified nonconservatisms.

4. Alert IC #11: This IC is "All alarms (annunciators) lost." The modifier "all" is unnecessarily restrictive and nonconservative, and is inconsistent with the intent of the equivalent NUREG-0654 IC (viz., "Most or all alarms lost"). If the important (should be identified) ESF alarms and annunciators are lost, then the intended threshold has been reached and an Alert declaration should be made. See also discussion for SAE IC #10 (item 8, below).

5. SAE IC #2: This IC concerns a degraded reactor core with possible loss of coolable geometry. As written, EALs #1 and 2.a are appropriately conservative; however, radiation levels in containment are not listed as additional symptomatic indicators of a degraded core geometry. Correlation between the extent of fuel damage and containment high-range radiation monitor (CHRM) readings may be demonstrated mathematically. CHRM readings should be incorporated into the classification scheme as symptomatic EALs. An additional EAL related to in-core neutron detectors should be considered, since inability to obtain motion on some detectors implies a degraded geometry. Hydrogen generation may also be correlated with degraded core conditions.

   As written, EALs #1 and 2.b. are nonconservative. EAL #1 (regarding reactor water level) defines a loss of RCS integrity, and EAL #2.b (significant site boundary doses reported by monitoring teams) defines a fuel failure and loss of containment (dose rates of this magnitude in the field could only be caused by a fuel failure and release). With a loss of the fuel, coolant, and containment boundaries (i.e., all three fission-product barriers), a General Emergency (rather than a SAE) is indicated; thus this EAL pair should be modified.

6. SAE IC #3: This IC reads, "Steam leak outside the containment without isolation." The EAL specifies, "Isolation required due to confirmed steam line break and one or more main steam lines fail to isolate." The licensee should assure that all possible release paths are addressed, including the path of steam supply to the RCIC turbines upstream of the MSIVs and failure to isolate on actuation of their protective functions. In this case as well as the case

of the EALs listed, the accident is a containment bypass accident.

7. SAE IC #6: This IC concerns complete loss of any function needed for plant hot shutdown. All the EAL criteria deal solely with the function "maintain reactor subcritical", and fail to address other functions required to maintain hot shutdown cooling, such as heat sink systems and vital auxiliaries. The operative word is "function." The licensee should identify all functions required for hot shutdown, and then determine systems required for those functions.

8. SAE IC #10: This IC states, "All alarms (annunciators) lost and plant transient initiated or in progress." (The EAL essentially restates the IC.) Alarms and annunciators, although very important in initiating operator response activities, are not safety systems, and are not required for safe shutdown of the plant. Initial operator attention may be commanded by an alarm, but once attention is drawn, response activities are performed in accordance with instrumentation and indications. Current NRC guidance, which has been communicated internally from Headquarters to the Regional offices, considers that an event involving loss of annunciators coincident with a plant transient should be declared as an Alert (absent the exceeding of any higher EALs) because of the valuable augmentation of onsite resources that accompanies that classification, but that a Site Area Emergency declaration for this event would be an overclassification. The licensee is thus encouraged to delete this IC in its entirety, since loss of annunciators is addressed in Alert IC #11 (see item 4, above).

9. SAE IC #11.b: This IC specifies the evaluation of "other plant parameters" for projecting potential dose rates in the field. However, except for EAL #1 ("Containment post-accident radiation monitor reads $\geq$ 10,000 mR/hr"), plant parameters are omitted. Since "plant parameter" EALs are also required to adequately address several General Emergency ICs, a full discussion of this subject is included for GE IC #2 (see item 10, below).

10. GE IC #2: This, the most "central" of the General Emergency ICs, concerns the loss of two of three fission-product barriers with a potential loss of the third barrier (e.g., loss of primary coolant boundary, clad failure, and high potential for loss of containment). The two parts of the EAL specify criteria for (1) whole-body dose rate or iodine concentration as actually measured at the site boundary, and (2) containment pressure or breach of containment (both site boundary and containment conditions must be met for the EAL to be fulfilled). The EALs do not adequately address the

plant conditions posed by the IC (i.e., failure of fission product barriers). Although the conservative radiological criteria posed by the listed EALs partially address the potential for increased releases, the criteria do not directly address evaluation of plant conditions. An adequate set of EALs for this IC should include criteria that permit the Emergency Director to determine what constitutes a "loss of fission-product barrier." The licensee's classification methodology does not define the criteria by which fission-product barrier integrity may be measured, although several of the appropriate EALs are used in the classification scheme. Two of these criteria are clearly defined as NUREG-0654 ICs and have been appropriately included in the EAL scheme:

- 50 gpm or greater primary leak indicates a loss of the RCS barrier (Alert IC #3, EAL #1), and
- 300 µCi/ml DE I-131 coolant activity indicates a loss of the fuel clad barrier (Alert IC #1, EAL #2).

There are numerous other EALs that potentially represent barrier integrity criteria, but are not included in the licensee's classification methodology. The following EALs are examples of plant conditions that if exceeded represent a loss of the specified barrier:

Fuel Cladding Integrity EALs

Reactor coolant sample greater than 300 µCi/gm DE I-131
OR Off-gas activity at the steam jet air ejector Hi-Hi Alarm (proper setpoint)
OR Drywell radiation monitor reading greater than 1000 rem/hr (proper setpoint)
OR Containment continuous air monitors (CAMs) for particulate, iodine, or noble gas increase 1000X above normal readings due to normal leaks of reactor coolant to containment (proper setpoint) or grab samples
OR Area radiation monitors increase 1000X above normal readings where reactor coolant (spent fuel pool coolant) flows, is processed, or leaks (proper setpoint).
OR Reactor vessel level decreases to 2/3 height of active fuel

RCS Integrity EALs

Primary coolant leak rate greater than 50 gpm
OR Inability to maintain reactor water level above top of active fuel
OR Drywell pressure greater than 2 psig with operating drywell coolers
OR Safety or relief valve stuck open

Containment Integrity EALs

Primary containment not isolated when required
OR Observed loss of primary containment structural integrity
OR Drywell pressure greater than 17.25 psig (or other appropriate value)
OR Explosive oxygen/hydrogen mixture in containment (proper value)
OR High radiation (greater than 5 E+4 Rem/hr) in containment

The remaining element of a comprehensive fission-product barrier analysis scheme missing from the licensee's EALs is the fundamental definition of barrier integrity vs. classification:

- one barrier challenged or failed signifies Alert (except containment only which is a UE)
- two barriers challenged or failed signifies SAE
- three barriers challenged or failed signifies GE

Containment bypass accidents must also be recognized in the definitions.

11. GE IC #4: This IC states, "Other plant conditions exist from whatever source, that make release of large amounts of radioactivity in a short time possible, e.g., any core melt situation." NRC guidance intended that this IC would generate an EAL giving the Emergency Director discretionary authority to declare a General Emergency if conditions warranted but did not match any of the other specific GE EALs. However, the EAL omits any such provision for exercise of discretion, instead addressing reactor vessel water level, containment high pressure or breach, and prediction of core damage by Reactor Engineering. Additionally, the example IC includes "any core melt situation," which is also omitted from the subject EAL. As discussed in item 10 above, without a comprehensive set of objective indicators of fission-product barrier integrity, it is not clear that all reasonably conceivable accident sequences would be classified in as timely a manner as possible. Specifically, as an example, requiring a Reactor Engineering evaluation in order to derive a General Emergency classification does not appear to be consistent with the time-sensitive responsibilities of the Emergency Director. If the concerns associated with GE IC #2 are corrected, there would be increased assurance that all reasonably conceivable accident sequences with potential radiological consequences can be classified in a timely manner.

12. GE IC #5.a: This IC is exactly the same as NUREG-0654 example IC #6.a, addressing a situation which "could lead to core melt in several hours with containment failure likely." EALs #1 - 5 associated with this IC include such conditions as:

- a scram,
- control rods not fully inserted,
- reactor power greater than zero
- core damage predicted by Reactor Engineering, and
- containment high pressure or breach

Additional sets of EALs are provided for ICs #5.b, 5.c, and 5.d; these are either similar to or simply reference the EALs for GE IC #4, the inadequacies of which were discussed in the previous item. In order to adequately address the intent of NUREG-0654 with the methodology used by the licensee for this IC, all possible core melt sequences would have to be developed and an EAL set devised for each conceivable sequence. That is obviously not feasible. The workable alternative is to establish the barrier integrity analysis scheme suggested in item 10 above; then, specific accident sequences do not have to be envisioned. The tools (barrier indicators) for analyzing any sequence are available. As previously stated, if the concerns associated with GE IC #2 are resolved, correct and timely classification capability is reasonably assured for all conditions.

ENCLOSURE 2

POTENTIAL AREAS FOR IMPROVEMENT IN
GRAND GULF EMERGENCY ACTION LEVELS

The following discussion makes reference to the initiating conditions (ICs) and corresponding emergency action levels (EALs) found in Table 4-1, "Summary of Emergency Action Levels," of the licensee's Emergency Plan (Revision 22), and relates the EALs to the four standard emergency classes that comprise the classification system: Unusual Event (UE), Alert, Site Area Emergency (SAE), and General Emergency (GE).

1. UE IC #1: This IC states, "Emergency Core Cooling System (ECCS) initiated and discharge to vessel." The EAL specifies valid manual or automatic initiation of an ECCS (LPCS or LPCI). However, valid ECCS initiation is not intended to be covered by this IC since higher classifications would apply to any ESF signal initiating ECCS with flow to the vessel (e.g., for a LOCA or steam line break). This IC is intended to address only ECCS actuations which were initiated by procedural or operator error. Thus the licensee should consider changing the EAL such that the initiation of an ECCS would result in a NOUE declaration when injection was not required and resulted in flow to the vessel.

2. NOUE IC #2: This IC states, "Radiological effluent technical specification limits exceeded." The EAL concerns entry into the action statement of Limiting Conditions for Operation (LCOs) in various listed Technical Specifications. EALs should specify the monitoring instruments and the threshold values, with a minimum of conversion required from reading to threshold. If the reading coincides with an instrument with multiple alarms, the alarm should be specified (high, high/high, etc.). An EAL which merely references a Technical Specification section is not adequate in view of the statement in the Emergency Plan (Section 4.1) that EALs "are composed of a combination of plant parameters (such as instrument readings and system status) that can be used to give relatively quick indication to the Station operating staff of the severity of the accident situation. The purpose of the EALs is to provide the earliest possible indication of actual or potential accident situations." This comment has generic applicability to EALs and will not be repeated.

3. UE IC #4: Although the EALs for this IC are adequate, the licensee should assure that all applicable limits are addressed by the EAL set. For example, "inadequate metal temperature prior to exceeding 200° F moderator temperature" may be an appropriate additional EAL.

4. UE IC #9: This IC regarding "Loss of engineered safety feature [ESF] or fire protection system function requiring shutdown by technical specifications" is adequately addressed by the EAL insofar as the ESF portion is concerned, but loss of fire protection system function is not included. It is recognized that Grand f Technical Specifications do not require shutdown on l of fire protection system functions. However, the IC is intended to be anticipatory, and the intent should be fulfilled, notwithstanding the status of Technical Specifications in this area. Therefore, the licensee should consider an EAL requiring a UE declaration if: a fire protection function has been lost, compensatory action cannot be achieved, and plant management orders a plant shutdown to maintain plant safety.

5. UE IC #15: This IC reads, "Other plant conditions exist that warrant increased awareness on the part of a plant operating staff or State and/or local offsite authorities or require plant shutdown under technical specification requirements or involve other than normal controlled shutdown." The EAL as written contains the incongruous implication that Safety Limits, when exceeded, are required by Technical Specifications. The EAL should be rewritten to clarify the intent. Further, other elements of the IC are absent from the EAL, such as Emergency Director discretionary declaration and "other than normal shutdown."

6. Alert IC #7: This IC reads, "Complete loss of any function needed for plant cold shutdown." Meeting the criteria specified in the EAL requires a "determination that there are no longer enough systems functional to attain or maintain the reactor coolant < 200° F." This EAL lacks clarity because "systems functional" is not defined and requires the Shift Supervisor to think of and recognize combinations that may not be immediately obvious. EALs should have characteristics of being well defined and immediately recognizable. Therefore, the licensee should consider listing the applicable functions, such as minimum makeup inventory, minimum train functions, heat sink systems, and vital auxiliaries.

7. Alert IC #12: This IC states, "Radiological effluents greater than 10 times technical specification instantaneous limits. Although the EALs as written are adequate, they are silent with regard to obtaining chemistry samples that exceed the threshold value. Exceeding the EAL threshold by analysis taken for any reason should clearly invoke a declaration.

8. Alert IC #14: This IC states, "Severe natural phenomena being experienced or projected." One of the three associated EALs (#1) addresses "A verified earthquake detected by in-plant seismic instrumentation ≥ OBE [Operating Basis Earthquake] levels." Based upon the experience of NRC inspectors, it is doubtful that (1) the seismic instrument is marked "OBE Level", (2) all Shift Supervisors have the applicable values memorized, and (3) the values can be quickly and readily found in the FSAR. Thus the licensee should assure that the relevant parameters are clearly stated in the EAL.

9. SAE IC #11: This IC addresses dose projections at and beyond the site boundary. Of the three associated EALs, only #1 appears to be problematic. It states, "Containment postaccident radiation monitor reads ≥ 10,000 mR/hr" [10 R/hr]. A gap release from the core with major containment leakage, or a core melt with design leakage, would be required to achieve the site boundary doses specified in the IC. Either of these conditions results in a calculated containment dose rate that exceeds 10 R/hr considerably. Thus a SAE would be declared upon a very conservative plant condition (if EAL #1 is correct as written), which is not desirable. The licensee should verify that detector shielding, calibration, or orientation results in the dose rate listed in EAL #1 for the equivalent amount of fuel damage and correct the EAL as appropriate.

10. SAE IC #13: This IC reads, "Severe natural phenomena being experienced or projected with plant not in cold shutdown." EAL #1 states, "A verified earthquake detected by in-plant seismic instrumentation ≥ SSE [Safe Shutdown Earthquake] levels." As discussed above in item 8 regarding Alert IC #14, the licensee should assure that the EAL is based on readily available plant parameters and delineates specific threshold values.

11. GE IC #1: Real-time dose assessment capability should be demonstrated as able to meet time-to-classification guidelines (15 minutes), and/or instruments should be identified with specific readings that if exceeded represent an EAL threshold. The dose assessment correlations should exist not only for effluent monitors (IC #1.a), but for plant conditions such as high CHRM readings, containment overpressure, and containment conditions of integrity (IC #1.b). Small-break LOCAs outside of containment and waste gas decay tank ruptures are other potential accident initiators that should have "plant condition" EALs. Because such EALs are also required to adequately address other GE ICs, a full discussion on the subject is included for GE IC #2 (item 10 of Enclosure 1). If Grand Gulf's dose assessment capability has consistently been demonstrated to

meet classification timeliness criteria with the listed EALs and incorporates evaluation of adverse plant conditions, this improvement item need not be further considered by the licensee.