50-416

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 15, 1996

Mr. C. R. Hutchinson
Vice President, Operations GGNS
Entergy Operations, Inc.
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SUBJECT: REVIEW OF THE CRITERIA FOR DETERMINING THE SAFETY SIGNIFICANCE OF PLANT STRUCTURES, SYSTEMS, AND COMPONENTS FOR THE GRAND GULF GRADED QUALITY ASSURANCE PROGRAM (TAC NO. M92420)

Dear Mr. Hutchinson:

This letter is part of the Graded Quality Assurance (QA) Initiative that the Commission has been conducting with the nuclear industry for the past two years. We have completed a review of the document titled: "Criteria for Determining the Safety Significance of Plant Structures, Systems, and Components for the Grand Gulf Graded Quality Assurance Program," dated October 11, 1995, that was prepared by your staff for use as part of this initiative. In the meeting of October 24, 1995, on procurement of low safety significance components, held at the Nuclear Regulatory Commission's (NRC's) headquarters, as documented in the meeting summary issued December 11, 1995, your staff stated that the document met the first of two objectives that were needed to implement graded procurement at Grand Gulf Nuclear Station. As stated in your staff's handout for the October 24, 1995, meeting, this was the objective of the development and application of technical criteria to identify those systems and components that are important to safety.

The document dated October 11, 1995, was also given to the NRC staff by your staff during the NRC staff's visit to the Grand Gulf site in November 1995 and was docketed in the NRC staff trip report issued on December 19, 1995.

Because the document was developed to meet the first objective for implementing graded procurement at Grand Gulf, the NRC staff reviewed the document in detail. As part of the Graded QA Initiative, we are providing you with our comments, questions, and preliminary conclusions on the technical adequacy of the document in meeting your stated objective. We find that, for the purposes of graded quality assurance, the proposed methodology for classifying systems as "QA safety significant" has merit although some enhancements are needed. Based on the document, we could not draw any overall conclusion on the appropriateness of the classification methodology for the safety significance of components.

We would appreciate your response to our comments, questions, and preliminary conclusions on the document and its application to graded procurement. This information would also assist us in developing the regulatory guides that NRC will be issuing on implementing graded QA at nuclear power plants; however,

this is not a request for additional information, because the staff is not reviewing the document for approving its use at Grand Gulf, and you are not required to submit such a response. As part of the Graded QA Initiative, we are providing the enclosure to this letter on the technical merits of your approach to graded QA and expect that you will consider the technical issues identified by the NRC to enhance this document and its implementation at Grand Gulf.

Despite the extensive comments, questions, and preliminary conclusions, we believe that the Grand Gulf Nuclear Station has a well-structured and reasonable approach for classifying systems for the purpose of graded QA. However, as indicated in the enclosure to this letter, enhancements to the document may be necessary to provide an adequate basis for grading procurement activities to an extent consistent with their importance to safety.

To assist you in responding to this letter, we are ready to meet with your staff on a mutually agreed upon date to discuss the enclosed NRC staff's comments, questions, and preliminary conclusions on the October 11, 1995, document.

Sincerely,

Jack N. Donohew, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosure: NRC Staff Comments, Questions, and Preliminary Conclusions

cc w/encl: See next page

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cc w/encl: See next page

signed 7/15/96

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Document Name: GG92420.LTR #1 7/9 #1 7/11

OFC	LA/PD4-1	PM/PD4-1	HQMB/DRCH	SPSB/DSSA	D/DRCH
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DATE	7/3/96	7/3/96	7/10/96	7/8/96	7/11/96
COPY	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO

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NRC STAFF COMMENTS, QUESTIONS, AND PRELIMINARY CONCLUSIONS

PROCUREMENT OF LOW SAFETY SIGNIFICANCE COMPONENTS

DOCUMENT TO IDENTIFY SYSTEMS AND COMPONENTS IMPORTANT TO SAFETY

GRADED QUALITY ASSURANCE INITIATIVE

GRAND GULF NUCLEAR STATION, UNIT 1

DOCKET NO. 50-416

The following comments, questions and preliminary conclusions are based on the staff's review of the document titled: "Criteria for Determining the Safety Significance of Plant Structures, Systems, and Components for the Grand Gulf Graded Quality Assurance Program," dated October 11, 1995. The questions and comments have been divided into those from the Quality Assurance (QA) and the Probabilistic Safety Assessment (PSA) branches. Tney have further been divided into specific review areas under these branches.

Despite the extensive questions and comments, the staff generally believes that Grand Gulf Nuclear Station (GGNS) has a well-structured, reasonable approach for classifying systems for the purpose of graded quality assurance (GQA). However, as indicated below, enhancements to the document may be necessary to provide an adequate basis for grading procurement activities to an extent consistent with their importance to safety.

Items 1 through 43 are generally from the QA branch and Items 44 through 60 are from the PSA branch.

I. QA Assessment:

Regarding Classifying Systems in general:

1. The term "QA safety significant (QASS)," as used throughout the report, needs to be defined.

2. Clarify the statement: "The non-QASS label does not remove any other design requirements" on page 3.

3. Of those "Non-QASS Systems" shown on Figure 2-1, page 4, what percentage are safety-related per regulatory requirements?

4. There seems to be an implicit assumption in the document that GQA means reduced QA. Does GGNS agree that the ranking system should allow for the possibility of QA requirements that exceed those now applied to "safety-related" items? Of course, there may not be any "safety-related"

equipment for which it is reasonable to increase QA beyond present levels, but the possibility should not be excluded a priori by the ranking system.

5. How does Grand Gulf intend on ranking passive items like pipes, fittings, supports, etc?

6. The approach used for QA ranking focuses on the functions of equipment and on the consequences of failure to perform a design function. Before reducing QA requirements for any equipment, it is necessary to consider all failure modes, any secondary or consequential failures, and all common-cause failures. Has GGNS considered an analysis of the consequences of all failure modes, such as might be documented by a failure modes and effects analysis (FMEA) before proposing equipment for reduced QA?

7. Grand Gulf's safety significance determination process is based on a qualitative extension and refinement of initial system and SSC importance as determined by the GG PSA. Please explain by what process is the PSA considered to have been validated for purposes of application to GQA?

8. The application of Graded QA will change some SSC reliabilities and availabilities. How does Grand Gulf plan on insuring that non-liner effects due to the aggregate change from reducing QA controls on all low ranked SSC does not result in an unanticipated risk increase?

Regarding Bases and Assumption:

9. Is the technical analysis that shows that the plant can tolerate a loss of engineered safety feature (ESF) Electrical Switchgear and Battery Room Ventilation function for up to 24 hours without affecting risk (as stated on page 47) within the design bases for GGNS and thus supported by a staff safety evaluation report (SER)?

10. What were the bases for concluding, on Table B-4, Page 47, that System Z77 (Emergency Switchgear & Battery Rooms Ventilation) has "a Potential Role in Risk Management, but with a Very Low Failure Probability"?

Regarding the Expert Panel:

11. Criterion 7 identifies systems that are considered risk significant by the collective judgement of the expert panel.

    The report provides no details concerning the deliberative process of the expert panel. Therefore, without additional information, the staff cannot comment on the rigor of the expert panel process.

12. Page 4: The flow chart (Figure 2-1) depicts that one system was added due to expert panel judgement, yet page 10 lists two systems added by the expert panel. Please reconcile this.

13. Page 4/10: For the one or two systems added by expert panel judgment, are there any deterministic criteria that could be extrapolated from that decision to add to the flow chart on page 4? In other words, the existing six criteria were not sufficient to delineate all of the QASS systems. Can the expert panel decision be evaluated to ascertain what criteria could be added to the flow chart (Figure 2-1) to envelop the systems that were added so that when the criteria are applied at another site, similar categorizations would result?

14. Give GGNS's view on whether or not a concern on the part of any one expert should be sufficient to prevent the categorization of equipment as non-QASS until further deliberations are carried out to address that expert's concern.

15. The document should provide more information about the use of expert panels, including at least answers to the following questions:

    a) What qualifications are required of panel members?

    b) How is diversity of expertise assured?

    c) What guidelines are provided to a panel to clarify the distinction between QASS and non-QASS?

    d) Were supporting data, such as PRA/IPE documentation, provided to panel members?

    e) What process is used to arrive at the panel's recommendations?

    f) Are measures taken to ensure independence of the panel and prevent undue influence by dominant personalities of panel members?

Regarding General Comments on Criteria for Component Classification:

16. Completeness of Component-Level Criteria: The document does not provide a technical explanation for the inclusion or exclusion of any criterion, nor does it provide any technical basis for the adequacy of the set of criteria. The technical basis for the choice of the particular set of component-level criteria needs to be provided.

17. Components in Non-QASS Systems: How is the procedure for classifying a system as non-QASS adequate to conclude that a failure of a component in that system would not adversely impact the functioning of another system?

Regarding the Criteria for Classifying Components in QASS Systems:

18. Based on the information provided, we could not conclude that the GGNS method for classify QASS components was reasonable. We need additional information including representative results that are obtained after applying these component classification criteria. We reviewed the

criteria for determining whether components in a QASS system should be classified as QASS and questioned, or noted, the following:

a) The rigor and review associated with classifying a component is significantly less than associated with classifying a system. Numerical criteria are not used, risk is considered in a qualitative, not quantitative manner, and an expert panel is not used (one person (an engineer familiar with the PSA) can essentially make the determination for Criterion H1 and H2). Is this an accurate interpretation?

b) For Criterion H2, it is not clear that an engineer familiar with the PSA has the appropriate experience and knowledge to determine components that are needed to support components modeled in the PSA.

c) Criterion H4 concerns components that support operator actions for previously determined QASS systems. As with Criterion 6 of the system criteria, we recommend that all operator actions that are modeled in the PRA be evaluated regardless of whether the actions are associated with a QASS designated system. What is the basis for the conclusion that all operator actions concerning non-QASS systems are unimportant from a risk perspective?

d) Criterion H5 uses the term "risk significant function." GGNS appears to define a term that is unclear. The criteria states: "If a component is not modeled in the PSA, but is required to perform a risk significant function in other plant risk studies..." We concluded that if a component is important in any other plant risk study, the fact that it is, or is not, modeled in the PSA has no relevance for this criterion.

19. We reviewed the confirming criteria in Appendix B.2 and concluded that, considering the concerns with the classification criteria, the validity of these confirming criteria cannot be determined. Confirming criteria that are based on lack of PSA detail or accepting failures that are only "small flow diversions," will require additional justification and clarification from GGS. Confirming criteria based on a defacto determination that a component is "highly reliable" are not considered by the staff to be acceptable within the current risk-informed framework and are more fully discussed in question 21.

Regarding the "Confirming Criteria for Non-QASS Systems":

20. We reviewed the confirming criteria in Appendix B for non-QASS systems and determined that, in general, the criteria were reasonable.

21. Confirming criteria (d) and (e) concern systems whose failure probability is considered "very low" or "too weak to quantify." The staff's current position is that there is a certain level of safety significance best measured by the consequence of failure, such that systems or SSCs above

this level should be categorized as "high" regardless of their assumed reliability. This position is reflected in GG's own Criteria 4 which explicitly includes highly reliable yet highly risk significant fission product barriers as "high" safety significant. A trial measure of RAW>10 for components is under consideration. Please provide your thoughts on this criterion as well as any suggestion you may have on a system level criterion.

22. We noted that plant annunciators were considered to have a low failure probability, did not meet the criteria for QASS, and, therefore, were considered non-QASS. Without the benefit of additional details concerning the deliberations of the expert panel, it is unclear why plant annunciators are considered non-QASS while control room heating, ventilation, and air conditioning (HVAC) is considered QASS. Both these systems have importance from a human performance perspective. What was the basis for these classifications?

23. B1.3, "Confirming Criterion (C)" states: If a system is not modeled in the PSA and does not meet the Maintenance Rule's screening criteria for risk significance, and meets no other expert panel test for safety significance, then it can be classified as non-QASS." What criterion is used for the "expert panel test for safety significance?"

24. B1.6, "Confirming Criterion (f)" states: If a system is either (i) a highly reliable structure, or (ii) a passive system with other requirements besides QA that are sufficient to assure reliability during accidents, then it can be classified as non-QASS.

    Please provide examples of these non-QA requirements that assure reliability. Many of the items listed in Table B-6 are highly reliable because of the QA that was applied during the design, procurement, and construction of the item. Even though design requirements were applied, QA was still required to verify that the materials of construction, construction techniques, configuration, et cetera, were in accordance with the design requirements. If some of the items in Table B-6 were repaired, replaced, or modified, and the item was classified as non-QASS, would the same level of QA controls applied to the original design, procurement, manufacturing, and construction activities be applied to the repair, replacement, or modification of the item? If not because the item is now classified as non-QASS, then how will it be determined whether it will continue to be highly reliable? This criterion should not be applied to the repair, replacement, or modification of such items as those listed in Table B-6. We do not believe that high reliability provides adequate justification to classify a system as non-QASS.

25. Concerning Confirming Criterion (d) on page 47: Why is it acceptable to accept an analysis up to 24 hours only? What is the basis for selecting 24 hours, and why not a longer time span?

26. Concerning Confirming Criterion (d) on page 47: What are some examples of what "other requirements besides QA requirements" that are being

considered? Does this refer to technical codes and/or surveillance testing?

27. Concerning Confirming Criteria (f) on page 48: Does this criteria duplicate criterion (d) in that credit is being taken for other design requirements beyond Appendix B that assure the chance of equipment failure remains low?

28. Confirming Criteria for Non-QASS Systems: It is clear that a system would not be classified as non-QASS if it satisfied any of the Criteria 1 through 6. Given that it satisfies none of those criteria, it would also be evaluated against confirming Criteria a through f. What is not clear is whether a system must satisfy all of the confirming criteria, or just one confirming criterion, to be classified as non-QASS. The ranking document is not clear on this point.

Regarding the "Confirming Criteria for Non-QASS Components":

29. B.2 "Confirming Criteria for Non-QASS Components" states: "The criteria below is used to confirm a component as non-QASS. These criteria are designed for use only after concluding that a component meets none of the criteria in Section 3.1 (except for the "catch all" criteria described in Section 3.1.3.)"

    There is no Section 3.1.3. Also, what is the "catch all" criterion and is Criterion H3 the "catch all" criterion? This is confusing because it permits a method to classify an item as non-QASS without guidance to the user. Please provide clarifying information.

30. Please confirm that if, using Section 3, "Criteria for Assigning QASS Classifications to Components in QASS Systems," a component is classified as QASS, one cannot use the Criteria in Appendix B of the document to reclassify this item as Non-QASS.

31. Criterion H2, Supports Component Modeled in PSA: This criterion is reasonable if it is changed to "needed to support another component or supercomponent identified by Criterion H1." What are your staff's views on the change to the criterion?

32. Confirming Criteria for Non-QASS Components: It is clear that a component would not be classified as non-QASS if it satisfied any of the Criteria H1, H2, H4, or H5. Given that it satisfies none of those criteria, it would also be evaluated against Confirming Criteria L1 through L4. As with Item 29 on Non-QASS Systems, it is not clear whether a component must satisfy all of the confirming criteria, or just one confirming criterion, to be classified as non-QASS. Does GGNS intend to revise the document to clarify whether a non-QASS component must meet all of the confirming criteria, or just one?

Regarding Criterion in general:

33. Concerning Criterion H5 (performs risk-significant function for IPEEE [individual plant examination - external events] or shutdown: This is an appropriately conservative treatment of components for which no numerical measure of risk significance is available.

34. Does the statement of the first paragraph on page 5, "Although Figure 2-1 suggests a sequential process, it is important to apply each criterion to each plant system," contradict Footnote 1 on page 10?

35. Explain how Criterion 5 (as described on pages 8 and 9) "establishes a minimum QA requirement for each safety function."

36. Concerning Criteria H1, H2, H4, and H5 (on pages 11 and 12): Do they include the fire risk Level 2 PSA? Assuming Criterion H5 encompasses more than seismic and shutdown risk analyses, shouldn't this be clarified in the document?

37. Does Criterion H3 (on page 11) mean that if one of the other 4 criteria cannot be used to designate something as a low safety significant component (LSSC) that it will automatically remain QASS?

38. Page 6: Criterion 2 statements are inconsistent. The first sentence indicates the criterion is linked to "high numerical risk importance values" (for fire and shutdown only, however). Later on reference is made to qualitative measures of risk importance for seismic. Clarify the discussion on this criterion.

Regarding Passive Components:

39. Concerning B.2.4 "Criterion L4" on page 50:

    a) Define passive components.

    b) What examples are there of the "several reasons", other than QA requirements, that account for the "disparity in failure rates" between passive and active components?

    c) Would Class 1E cables and wiring be considered passive components?

    d) Discuss if this criterion could lead to the possibility of considering that the reactor pressure vessel (RPV) is a highly reliable component and can be classified as non-QASS because the industry has never had a vessel rupture?

40. Concerning B.2.4 "Criterion L4" which states: "If a passive non-active component is considered highly reliable regardless of its QA status, then it can be classified as non-QASS (or nuclear steam supplier, NSS)."

Although these items are passive, the materials of construction, configuration, et cetera, need to meet design requirements. If these passive items are classified as non-QASS, then graded QA would be applied, and a graded commercial grade (CGI) dedication process would be applied. As a result, the level of assurance that these passive items would remain highly reliable would be reduced because the original QA controls that resulted in the passive item being highly reliable would be reduced. Applying a graded CGI dedication process to items classified as Non-QASS could result in significantly reducing the QA controls for the procurement of these passive items. Thus, discuss what is the basis for assuring the passive items remain highly reliable?

41. Concerning Confirming Criterion (f) on page 48: Why is cable considered a passive item? Could this criterion be used to categorize other than Class 1 piping as non-QASS?

Regarding Flow Paths and Diversions:

42. B.2.3, "Criterion L3" on page 50 states: "If a component is in a flow path that could create only a small flow diversion, then it could be classified as non-QASS (or NSS)." Provide the engineering analysis that justifies the PSA assumption that flow diversions of less than 1/3 piping diameter are not detrimental to carrying out the system function.

II. PSA Assessment:

Regarding System Criteria and Maintenance Rule:

Use of PRA or other risk studies

43. Criterion 1 states: "If a system satisfies any numerical screening criteria from Grand Gulf's Maintenance Rule Program Position Statement the system is classified as QASS."

    a) The Maintenance Rule risk ranking may be an acceptable starting point for determining risk importance for other applications. However, the staff recommends that the integrity of the Maintenance Rule risk ranking remain intact. That is, both the deliberations and the numerical criteria used in the Maintenance Rule risk ranking process should be evaluated and validated for the GQA risk ranking process. This criterion, as written, discards the Maintenance Rule expert panel deliberations. The basis for the reconciliation between the expert panel ranking and the results of the numerical risk ranking need to be addressed in a rigorous manner. For example, it may be important for the GQA expert panel to fully understand how the Maintenance Rule expert panel determined the risk ranking for the Turbine Building Cooling Water (TBCW) system, although it met all four numerical screening criteria, was not considered risk significant or why the Standby Liquid Control (SLC) system was considered risk significant when it met none of the

numerical screening criteria. More specifically, these expert panel conclusions may imply that the PRA model, input and/or assumptions are incorrect. If the PRA is conservative in the treatment of the TBCW system, the concern would be the masking effects this conservatism would have on other systems like the Standby Service Water (SSW) system. Finally, the staff noted that the TBCW is ranked low and the instrument air system is ranked high. Discuss if this ranking is inconsistent with the IPE results that shows the loss of TBCW initiating event contributes almost twice as much more to core damage frequency (CDF) (1.3%) than does the loss of instrument air initiating event (0.7%)?

b) There are also a number of issues which suggest that the numerical importance measures do not provide a fully adequate quantification input to the expert panel. Lessons learned from various NRC studies and pilot applications show that the following are potentially important issues:

(1) Truncation limits: Results of various studies show that, for a CDF of approximately 1E-5 per year, a truncation limit in the range of 1E-11 to 1E-13 is required for stability in the ranking results. What truncation limit is used by GGNS?

(2) Level of modeling of initiating events: Detailed (component level) models for initiating events caused by the loss of support systems is important when ranking in the component level. Discuss how this has been accounted for.

(3) Dynamic versus static plant configurations: Discuss how the effects of the different plant configurations on component ranking have been evaluated. This might be important during periods where there is scheduled maintenance or rolling maintenance when pre-specified sets of components are brought down for maintenance for a pre-specified amount of time.

(4) Common cause failures: For those components for which common cause failure (CCF) contributions are not included in the PRA models, and this exclusion is justified based on the historical and engineering evidence driven by current requirements, the CCF contribution may become significant under the proposed graded QA approach. Discuss this. Has a sensitivity study (or any other type of study) been conducted that could identify those components which can shift to a high category as a result of uncertainties in CCF rates?

(5) Multiple component considerations: In risk ranking, the structures, systems, and components (SSCs) are binned based on single event importances. For those components assigned in the low category, one needs to assure that the aggregate impact of multiple components is negligible. Does the multiple component

importance measure identify which combination of SSCs might be risk significant, therefore requiring them to be shifted to a higher category?

(6) Modeling of recovery actions: The concern in this area stems from situations where very high success probabilities are assigned to sequences, therefore resulting in related components being risk insignificant. Furthermore, it is not desirable that the ranking of SSCs be impacted by recovery actions which are only modeled for limited scenarios. Therefore, discuss whether SSCs should be re-ranked without recovery actions?

c) Because of the limited information submitted, we were unable to make conclusions about the adequacy of the PRA for GGNS or analyze the distribution of risk contributors. In addition, we cannot conclude whether the actual cutoff levels (i.e., 90% or 99.9%) are appropriate without consideration of the dominant contributors to risk. Discuss this.

d) It is not clear whether the expert panel deliberated on whether the cutoff levels for the Maintenance Rule are acceptable for use in GQA. Moreover, we were not able to determine whether the effect of common-cause failures, the aggregate effect of relaxing QA requirements, the impact of the truncation limit, and uncertainties were appropriately considered in the risk ranking process (Comment (b) above).

Regarding Fire and Shutdown Risks:

44. Criterion 2 states: "If a system is found to be risk significant in any of Grand Gulf's risk studies (i.e., IPEEE and shutdown), the system is classified as QASS."

a) We determined that Criterion 2 focusses mainly on the fire and shutdown risks and states that seismic risk was found to be insignificant. We also determined that, in addition to fires and seismic, high winds and tornadoes should be considered. We have concerns on the potential effects of non-QASS structures on QASS systems in the power block from the effects of these external events. Examples would include the issues discussed in IN 93-53. Discuss how Confirming Criteria (b) in Section B.1.2 addresses this concern.

b) The document stated that for seismic events, the Grand Gulf study used "a deterministic 'success path' method that evaluates plant safety functions that prevent core damage. As a result, the seismic evaluation found no new risk significant systems." We determined that more information is required to determine the validity of a technique that can interpret non-quantitative, deterministic

analysis and lead to a conclusion that there are no new risk significant systems. Provide this information.

c) In Appendix A.2, it appears that systems were ranked as QASS based on a qualitative assessment of the functions that would either mitigate a fire initiating event or prevent a more severe fire damage state. It is not apparent that plant systems were ranked based on high numerical risk importance values measured relative to the change in core damage as was stated in Section 2.2. If the entire PRA model was indeed not used for numerical ranking of fire risk, then insights on systems for accident mitigation might not be obtained: (i.e. the initiating event frequencies and fire damage state frequencies used in the fire PRA are based on current QA standards. Since the fire PRA model already assumes current QA requirements, keeping the fire suppression and detection systems as QASS will not lower the initiating event frequencies. Therefore, if fire risk is significant when compared to the internal event initiator risk, the total overall CDF would change and the relative importances of systems needed for core damage mitigation might also be affected.) Discuss these statements.

d) In Appendix A.3, it appears that the determination of shutdown risk is based only on CDF. Arguments were made that the CDF from shutdown is 30 times less than the CDF from power operation. Address the risk from large early releases when taking into account the fact that the containment is more likely not to be isolated during shutdown modes.

45. Concerning Criterion 2, Significant for IPEEE or Shutdown: The referenced appendix adequately explains the limits of the shutdown study and how the numerical measures were obtained and applied. However, there is no explanation of numerical measures from the fire risk analysis. Further, it is not clear how system P47 came to be classified as QASS. Why doesn't Appendix A.2 present the basis for numerical measures, the actual measures for each system, whether P47 is QASS because of its presence in a significant fire area, and whether any systems in significant fire areas are not QASS?

Regarding Radionuclide Releases:

46. Concerning Criterion 3 which states: "If the system is risk significant for preventing large early radionuclide releases from core damage accidents, it is classified as QASS."

a) The risk ranking methodology for this criterion ranks system importance relative to a base case. The importance of this base case is not clearly established and it is difficult to place in context the relative ranking of other systems or properly interpret what is meant by "relatively more important" or "relatively less important." Clarify the importance of the base case so that it may

be better understood.

b) In the risk importance calculations, weighting factors were used for the various release categories for combined event tree (CET) sequences to approximate off-site public dose. We will need additional information on how these weighting factors are derived. Specifically, address the following: 1) how much more weight is given to the large early releases, and 2) are representative offsite consequences calculated based on site characteristics like population distribution and meteorology, or are generic inputs used?

c) In reviewing the results in Table A-4, the containment, the suppression pool cooling function, the suppression pool makeup function, and the containment sprays are ranked relatively low. Is this because the ranking is dominated by the core cooling systems which support both core damage prevention and containment cooling and heat removal? (The strength of the containment, by itself, will not result in this kind of ranking, since the IPE shows that 33% of all severe accidents will result in a containment breach of some kind.)

47. Concerning Criterion 4, Primary Fission Product Barrier: It is appropriate that systems in the primary fission product barrier be designated QASS. The documentation of the Level 1 PSA should list any other component that was not modeled because the component is highly reliable. The document should state whether there are any other components that were not modeled in the Level 1 PSA because of assumed high reliability. If there are any such components, the document should state how their systems are classified.

Regarding Deterministic Criteria:

Integrating Deterministic Criteria

48. Criterion 4 states: "If a fission product barrier is not explicitly modelled in the IPE because of its inherent high reliability, it is classified as QASS." We agree that this is an appropriate criterion. Although it should not affect the results of applying the criteria, we recommend that the term "IPE" be replaced with "PSA".

49. Criterion 5 states: "Ensure that at least one system or set of systems necessary to complete each critical safety function is classified as QASS."

a) The stated purpose of this criterion is to identify a minimum acceptable complement of systems needed to perform the safety functions that prevent core damage. The report further indicates that it is impractical for Grand Gulf to modify its PSA to make more detailed importance calculations. Instead, according to the report, this deterministic criterion serves as an alternative way of

ensuring that QA changes do not reduce safety function reliability to an unacceptable level. The purpose of this criterion is unclear. We conclude that the intent of this criterion appears to be similar to the intent of Criterion 4, that is, to identify important systems that are not modeled in detail or sufficiently in the PSA. In other words, this criterion is designed to compensate for systems that are modeled, but do not show up as important because of the modeled redundancy and/or diversity by ensuring at least one redundant or diverse system is QASS. As stated, the purpose seems to detract from the defense-in-depth philosophy. Explain the impact on the defense-in-depth philosophy and clarify the criterion's purpose.

b) We do not agree that this criterion is an alternative way of ensuring that QA changes do not reduce safety function reliability to an unacceptable level. We conclude that sensitivity studies looking at group components could be used to provide a more quantitative measure of the change in plant risk associated with QA changes. For those components assigned in the low category, one needs to assure that the aggregate impact of multiple components is negligible. Does GGNS agree that the multiple component importance measure should identify which combination of SSCs might be risk significant, therefore requiring them to be shifted to a higher category?

c) We agree that this criterion could minimize the potential for inter-system common cause failures which might be introduced by the decrease in QA requirements for groups of similar components. However, because components within QASS systems could be graded non-QASS, discuss what assurances exist that there is at least one success path which contains components associated with performing the QASS function that are all QASS.

Regarding Operator Action:

50. Criterion 6 states: "If instrumentation or actuation equipment in remaining non-QASS systems is necessary for the operator to perform an operator action modeled in a QASS system, then ensure that at least one system or set of systems (sufficient to support the actions) is classified as QASS."

The report states that actions associated with QASS systems are potentially risk significant and implies that actions associated with non-QASS systems are not risk significant unless the system is needed to support a QASS operator action. We recommend that all operator actions that are modeled in the PRA be evaluated regardless of the whether the actions are associated with a QASS system identified by applying the previous 5 criteria. Discuss why this criterion should not be revised and applied independently, and not be dependent on the results of the other 5 criteria.

51. Concerning Criterion H4, Support PSA-Modeled Operator Action for a QASS System: As mentioned previously, when operator action is required, failure probabilities for instrumentation or actuation may not be significant compared with the probability of operator error. Resources might better be spent in measures to reduce the probability of operator error than in improving an already insignificant failure probability. These components should be modeled in the PRA, which can provide an indication of their importance. GGNS should justify why components required to support PSA-modeled operator actions should not be added to the PSA, if not already present. Then these components should be evaluated for importance. If they are omitted from the PRA because their failure probabilities are known to be negligible in comparison to the human error probability, then they may be classified non-QASS. Discuss these statements.

52. Concerning Criterion 6, Operator Action Support: Is there any intent to revisit this criterion if the expert panel adds a system that requires an operator action?

General Comments:

53. Establishment of GQA would result in a simultaneous change in the reliabilities of many components. Discuss if the effects of these changes cannot be evaluated individually, that they must be incorporated into a revised PRA, including a reevaluation of each failure that was screened out of previous PRAs, and reexamined for potential common-cause failures.

54. Page 1: The statement that "many of these components have a negligible role in preventing core damage..." needs to have a statement that this is from a PRA perspective, not necessarily a deterministic viewpoint.

55. Page 2: The statement that "These deterministic criteria are intended to have a conservative bias, and substitute for more elaborate probabilistic modeling" inaccurately describes the need to have deterministic criteria to supplement and compensate for PSA modeling issues.

56. Page 11: The criteria for determining QASS systems includes several criteria that supplement criteria based on PSA risk screening. However, the component criteria are more directly linked to whether components are modeled in the PRA, support a component modeled in the PRA, or are needed to support an operator action modeled in the PRA. Discuss, if the PRA models only a small percentage of the SSCs in the plant, are these reasonable assumptions to make. It was already recognized at the system level that PRA limitations necessitate a broader set of criterion, this seems contradictory to the component level criteria. What about a criteria on fission barriers not modeled in PSA? What about a criterion on components needed to carry out safety functions? What about criterion on components needed to carry out safety significant operator actions not modeled in PSA?

57. Candidates: It is not clear what is meant by "candidates" for reduced QA requiremenis. Are the Non-QASS components the candidates for reduced QA? Or are all of them to have reduced QA while the QASS components are only candidates? Clarify what is meant by "candidates."

58. Page 1: The characterization that up to 70% of a replacement part's cost is attributable to QA "pedigree" is highly subjective. Provide a comparison of components that were used to derive this conclusion. Are the technical characteristics really the same?

59. Page 18: There is a typo in Section 9.2, 2nd line, the word "significant" should be "significance".