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OFFICE OF THE
GENERAL COUNSEL

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

August 24, 2007

E. Roy Hawken, Chair
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Anthony J. Baratta
Administrative Judge
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Washington, DC 20555

In the Matter of
AMERGEN ENTERGY COMPANY, LLC
(Oyster Creek Nuclear Generating Station)
Docket No. 50-0219-LR

Dear Administrative Judges:

In accordance with the "Memorandum and Order (Prehearing Conference Call Summary, Case Management Directives, and Final Scheduling Order)" (Apr. 17, 2007) (unpublished), please find enclosed "NRC Staff Proposed Questions For Evidentiary Hearing" (Aug. 24, 2007).

Pursuant to 10 C.F.R. § 2.1207(a)(3)(i), the enclosed questions are being submitted only to the Board at this time. The Staff understands that, consistent § 2.1207(a)(3), the questions will be confidential until propounded by the Board or until issuance of an initial decision, at which time they will be forwarded to the Secretary of the Commission for inclusion in the official record of this proceeding.

Sincerely,

Mary C. Baty
Counsel for the NRC Staff

Enclosure: As stated

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August 24, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
AMERGEN ENERGY COMPANY, LLC) Docket No. 50-219-LR
)
(Oyster Creek Nuclear Generating Station))

NRC STAFF PROPOSED
QUESTIONS FOR EVIDENTIARY HEARING

Pursuant to 10 C.F.R. § 2.1207(a)(3) and "Memorandum and Order (Prehearing Conference Call Summary, Case Management Directives, and Final Scheduling Order)" (Apr. 17, 2007) (unpublished), the staff of the U.S. Nuclear Regulatory Commission ("Staff") hereby submits proposed questions for the Board to consider asking witnesses in this proceeding.

I. Questions for Dr. Hausler Regarding Stability of the Drywell Shell

A. Dr. Hausler's Expertise

Citizens rely on the expert opinion of Dr. Hausler to support their contention that the frequency of AmerGen's UT measurements is not adequate to ensure an "adequate safety margin." See LBP-06-22, 64 NRC 229, 240. Citizens, however, have not demonstrated that Dr. Hausler is sufficiently qualified by knowledge, training, skill, or experience to offer opinions on structural stability. See, e.g., Prefiled Rebuttal Written Testimony of Dr. Rudolf H. Hausler Regarding Citizens' Drywell Contention (Aug. 17, 2007)("Citizens' Rebuttal Testimony") (stating "I will answer [the Board's] question 12 to the best of my ability in this pre-filed testimony, even though I am not a structural engineer"). The objective of the following proposed questions is to determine what weight, if any, should be given to Dr. Hausler's opinions on structural stability.

1. Do you have any formal training in elastic stability of structures? If so, please describe the extent your training.
2. Do you have any experience with elastic stability of structures? If so, please describe the extent of your experience.
3. Do you have any expertise in calculating stresses in shell structures? If so, please describe the extent of your experience.
4. Have you performed any buckling stability calculations? If so, please describe when, the number of times, for what, and for whom you performed those calculations.
5. Have you performed any buckling stability calculations for Oyster Creek? If yes, what did you conclude?
6. Do you have experience in interpreting the results of buckling analyses? Please describe the extent of your experience in interpreting the results of buckling analyses.
7. Do you understand the significance of a factor of safety with respect to buckling? If yes, please describe your understanding with respect to the significance of a factor of safety.
8. Do you think a factor of safety slightly less than two would cause the shell to buckle? If so, what is the basis for your conclusion?

B. Function of the Drywell

The Staff's position is that if buckling of the drywell shell in the sand bed region were to occur it would occur during refueling (when the shell is subject to the greatest load and when buckling would most likely to occur) and the consequences of such a failure would be minimal because the drywell does not perform a containment function during refueling outages. See NRC Staff Rebuttal Testimony of Hansraj G. Ashar,

Dr. James A. Davis, Dr. Mark Hartzman, Timothy O'Hara, and Arthur D. Salomon and Answers to Board Questions (Aug. 17, 2007) ("Staff Rebuttal Testimony"), at A28. The objective of the following proposed questions is to determine whether Citizens agree with the Staff that buckling would occur, it would occur during refueling, i.e., the brief period when the shell does not perform a containment function.

1. For purposes of Citizens' admitted contention, do you agree that the drywell has two functions: (a) containment function under accident conditions and (b) supporting the load of water in the refueling cavity during refueling?

2. For purposes of Citizens' admitted contention, does the drywell perform a containment function during refueling?

3. For purposes of Citizens' admitted contention, do you agree that the only function of the drywell during refueling is to support the load of the water in the refueling cavity?

4. For purposes of Citizens' admitted contention, do you agree that buckling of the drywell shell is only a concern during refueling?

5. Do you know how many days and how often Oyster Creek's drywell shell is subject to refueling loads?

6. In Citizens' Exhibit 38, you cite the importance of risk assessment. Wouldn't the risk of drywell shell buckling be reduced because of the limited time the drywell shell is exposed to refueling loads?

C. Safety Margin

Citizens contend that the frequency of AmerGen's UT measurements is not adequate to ensure an "adequate safety margin." See LBP-06-22, 64 NRC at 240. The objective of the following proposed questions is to better understand what Citizens mean by "margin."

1. Is your definition of "margin" the difference between the average measured thicknesses and UT acceptance criterion? If no, please provide your definition.

2. How does "margin" relate to the concept of "factor of safety" specified in ASME Code Case N-284?

3. Based on your definition of margin, what are the clear, physical consequences for the sand bed region of the drywell shell having zero "margin"?

4. Based only on the data provided by AmerGen, what is the remaining margin for the buckling (refueling condition) criteria for the drywell?

II. Questions Regarding Drywell Corrosion

A. Questions for Dr. Hausler Regarding Drywell Corrosion Rate

AmerGen asserts that corrosion has been arrested. See Staff Direct Testimony at A22. The Staff's position is that no significant corrosion was evident from AmerGen's inspection results. *Id.* Citizens assert that corrosion in the sand bed region of the drywell has not been abated. See "Pre-Filed Direct Testimony of Dr. Rudolf H. Hausler" (July 20, 2007) ("Citizens' Direct Testimony") at A16. The objective of the following questions is to determine the basis for Citizens' assertion that corrosion is occurring in the sand bed region of the drywell.

1. In Answer 2 of Citizens' Direct Testimony, you estimate 0.049 inch per year as the rate of corrosion of the drywell shell in the sand bed region. Does the UT data since 1992 support that corrosion rate?

2. Doesn't the difference the drywell shell thickness measurements in 1986 and 2006 indicate an average corrosion rate of about 2 mils per year?

3. On page 23 of "Citizens' Rebuttal Regarding Relicensing of Oyster Creek Nuclear Generating Station" (Aug. 17, 2007) ("Citizens' Rebuttal Position"), Citizens

assert that rather than using the observed corrosion rate of 2 mils per year average (which AmerGen contends represents the corrosion rate over 20 years), it would be prudent to use a much higher rate of 10 mils per year. What is the basis for Citizens' assertion that the corrosion rate will be higher in the future than was observed in the past 20 years?

4. Do Citizens contend that new water introduced onto the interior floor during control rod drive repairs supports the higher corrosion rate? Is yes, why?

5. Do Citizens contend that use of containment spray would cause the higher corrosion rate? If yes, why?

6. Does AmerGen have means to pump water out water introduced into the interior floor?

7. Why would the frequency introduction of water into the interior of the drywell be greater in the future than in the last 20 years?

8. On page 23 of Citizens' Rebuttal Position, Citizens assert that AmerGen made critical errors in estimating exterior corrosion, including failing to consider the situation where the plant is forced to fill the refueling cavity in a forced outage. How often does Oyster Creek refuel during a forced outage (i.e., how often would the refueling cavity be filled with water during a forced outage rather than a planned refueling outage)?

B. Questions for Dr. Hausler Regarding Drywell Corrosion

In Memorandum and Order (Denying AmerGen's Motion for Summary Disposition) (June 19, 2007) (SD Order) (unpublished) at 9 n.11, the Board stated that it expected the parties to address the pattern of corrosion in the sand bed region of the drywell and how that pattern of corrosion might affect the drywell's susceptibility to buckling. Dr. Hausler provided contour plots, which he asserts illustrate the pattern of

corrosion. The Staff's position, however, is that Dr. Hausler's plots overestimate the extent of corrosion and are not consistent with either the observations of the NRC inspector who physically entered the bays or AmerGen's documented UT inspection results. See Staff Rebuttal Testimony at A26, A27. The objective of the following proposed questions is to understand the bases for Dr. Hausler's contour plots.

1. Do you have direct knowledge of the condition of the drywell?
2. Have you validated your plots against AmerGen's video records, color photographs of the inspection, or data sheets? If yes, which one(s)?
3. What is the accuracy of the contour plots presented in your testimony?
4. What is the uncertainty in your contour plots?
5. Have you done any sensitivity analysis to test your assumptions about the physical characteristics of the corrosion of drywell shell in the sand bed region?
6. Have you done any sensitivity analysis on the inputs to your contour plots?
7. If yes, did your plots change?
8. If yes, how did your plots change?
9. Do you have additional "runs" of this contour plotting software using different increments (e.g., instead of increments of 25 mils, increments of 10 mils)?
10. If yes, what were the other increments?
11. If yes, what was your basis for selecting the 25 mil increment?
12. Did you generate any plots depicting different patterns of degradation that are not included in your testimony or Citizens' Exhibits?
13. If yes, how was the pattern different?
13. If yes, why didn't you include them as exhibits to your testimony?
14. Are you familiar with American Society of Nondestructive Testing (ASNT)

qualifications for visual inspectors?

15. If yes, on page 9 of Citizens' Exhibit 39, you refer to an "inspector" as saying, "I could not visually determine which of the thin spots are the thinnest." Was that person trained in accordance with ASNT-SNT-TC-1a to make visual observations of this nature?

C. Questions for Dr. Hausler Regarding UT Measurements

The accuracy and reliability of ultrasonic testing of the drywell in the sand bed region has been an issue throughout this proceeding. The objective of the following questions is to understand Dr. Hausler's qualifications (knowledge, training, skill, or experience) to analyze, interpret, and provide expert testimony on AmerGen's UT measurements, and what weight, if any, should be given to his opinions.

1. Have you ever received training in taking UT measurements? If yes, please describe training.

2. Have you received training in interpreting and analyzing UT measurements? If yes, please describe that training.

3. Do you have any experience in interpreting and analyzing UT measurements? If yes, did that experience include interpreting and analyzing VT data from a drywell shell?

4. Have you read AmerGen's UT procedures?

5. Do you understand the qualifications of a VT-1 inspector? If yes, describe your understanding of the qualifications of a VT-1 inspector.

6. Based upon a review of AmerGen's UT procedures, and AmerGen's use of qualified inspectors, technicians and supervisors, what is Citizens' estimate, in mils, of the systematic error in the UT measurements?

D. Internal v. External UT Measurements

Citizens assert that "it is essential to use the external data if the margins are to be calculated in a realistic manner" and that the external measurements were not taken at the thinnest points. See Citizens' Rebuttal Testimony at A12, A14. The Staff, however, asserts that the use of external measurements only, without regard to the internal measurements, is not representative of the condition of the drywell because the external measurements are conservatively biased and provide incomplete information about the thickness of the surrounding areas. The objective of the following questions is to probe Citizens' reliance on external measurements.

1. Is it contradictory to question the validity of AmerGen's external UT measurements yet use them as the basis for your contour plots?
2. Isn't it true that a comparison of the internal UT measurements with the external measurements would provide reliable information about the thickness of surrounding areas?
3. Isn't it true that a comprehensive evaluation of the extent of degradation can only be achieved by using all reliable inspection data instead of relying solely on selected points?
4. In A.16 of Citizens' Rebuttal Testimony you state, "the idea of grinding is to create a flat area at the thickness of the thinnest point, not to make the area thinner." How would you, in practice, grind an area without making that area of the shell thinner in some way?

E. Questions for Dr. Hausler Regarding Corrosion Mechanism

Expert opinions must have an adequate factual basis in order to be considered by the trier of fact. The objective of the following proposed questions is to determine whether certain statements by Dr. Hausler regarding corrosion have an adequate factual

basis.

1. In Citizens' Exhibit 39, you indicate that pit depth can only be measured in reference to the original surface and therefore physical depth measurements made by GPU are not useful. Is it your position that because of corrosion, none of the original drywell shell surface remains from which a reference could have been established? If yes, what is your basis?

2. On page 4 of Citizens' Exhibit 39, you state, "corrosion could, at least in certain cases, be more severe outside the areas that have been examined by UT." Is this speculation on your part?

3. On page 6 of Citizens' Exhibit 39, you state that there is a 2.5% probability that a measurement of less than 0.542 inch may exist and therefore there is "a 2.5% or 0.5% probability that in the event of a nuclear accident the drywell may not serve as a primary containment and may release radioactive emanations into the environment." Is it your position that a single measurement of 0.542 inch could cause failure of the drywell shell?

4. Do you agree that radioactive emanations may be released into the environment only if the drywell shell is breached? If yes, what would cause the drywell shell to breach?

F. Questions for AmerGen (Messrs. Polaski, Abramovici, Tamburro, and Dr. Harlow) Regarding Drywell Shell Corrosion

In its direct testimony, AmerGen states that the external UT measurements of the thickness of the drywell shell were taken at the thinnest points and that in order to take UT measurements at those points, it was necessary to grind a flat surface large enough for the UT probe. See AmerGen's Pre-Filed Direct Testimony Part 3 ("AmerGen Direct Testimony") (July 20, 2007) at A18. AmerGen also states that it chose to not to perform

UT measurements on a grid because doing so would have required grinding of larger areas and would have unnecessarily reduced the thickness of the drywell. *Id.* The objective of the following proposed question is to identify the areas where grinding occurred.

1. Which external points were ground to facilitate UT measurements?

III. Questions For Dr. Hauser Regarding Epoxy Coating

In the SD Order the Board stated that one of the remaining litigable issues in this proceed is “the existence *vel non* of a corrosive environment” in the sand bed region of the drywell. SD Order at 7. The Staff’s position is that the likelihood of a corrosive environment existing in the drywell during plant operations is low and that proper implementation of AmerGen’s commitments will reduce the potential for such an environment to exist in the future. Citizens assert that corrosion can occur beneath the epoxy coating and that there is a chance that some of the exterior of the drywell shell is not covered by the epoxy. The objective of the following questions is to probe the positions of Citizens and AmerGen on the effectiveness of the epoxy coating in preventing corrosion.

1. Have you calculated the corrosion rate you would expect underneath the epoxy coating if water is eliminated from the external sand bed area?
2. If yes, what is the rate? Explain how you performed your calculation.

IV. Questions for Dr. Hausler Regarding Statistics

A. Questions Regarding Dr. Hausler’s Expertise in Statistics

The Staff questions whether Dr. Hausler is qualified by knowledge, training, skill, or experience to offer opinions on statistical data analysis. The objective of the following questions is to determine the weight to be afforded Dr. Hausler’s opinions on statistical analysis of UT data results.

1. Do you have training in statistical analysis? If yes, please describe your training in statistical data analysis.

2. Do you have experience performing statistical analysis? If yes, please describe your experience in performing statistical data analysis.

3. Do you have any training in extreme value statistics? If yes, please describe.

4. Do you have any experience using extreme value statistics? If yes, please describe when, how, and for whom you used extreme value statistics.

B. Questions Regarding Statistics and Regulatory Requirements

Citizens contend that 95% confidence is required to provide reasonable assurance. See, e.g., Citizens' Rebuttal Position at 11. The objective of the following proposed question is to probe the regulatory basis for Citizens' assertion.

1. Does the ASME Code require 95% confidence for analysis of UT thickness measurements? If yes, please state where the ASME Code includes that requirement.

2. Do NRC regulations require 95% confidence for analysis of UT thickness measurements? If yes, please state which NRC regulation requires 95% confidence in UT measurements.

3. Does AmerGen's calculation of 95% confidence in its analysis of the data constitute an NRC requirement? If yes, please explain.

4. Do AmerGen procedures require calculation of 95% confidence? If yes, which one?

V. Questions for Dr. Hausler Regarding
AmerGen's Commitments & Aging Management Program

The Staff's position is that based on the 2006 UT measurements and the AmerGen Aging Management Program, as enhanced by commitment to perform UT inspections every other outage (as required by a proposed license condition), provide reasonable assurance that drywell shell integrity (and the intended function of the drywell) will be maintained during the period of extended operation. Citizens dispute this position. The objective of the following proposed questions is to probe Citizens' position on AmerGen's Commitments and Aging Management Program.

1. Are you familiar with the AmerGen's multi-prong Aging Management program as committed in SER, Appendix A?

2. Isn't it true that taking UT measurements every other outage is only part of AmerGen's aging management program?

3. Isn't it true that taking UT measurements in the sand bed region at shorter intervals would subject the workers to added radiation exposure?

4. Is your suggested frequency of drywell UT measurements consistent with the as low as reasonable achievable (ALARA) principle? If yes, why?

5. Does the benefit of your suggested UT measurement frequency outweigh the increased dose to workers conducting measurements?

Respectfully submitted,



Mary C. Baty
Counsel for NRC Staff

Dated at Rockville, Maryland
this 24th day of August, 2007