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May 31, 1988
5000-88-1561

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Mail Station P1-127
Washington, D.C. 20555

Gentlemen:

Subject: Oyster Creek Nuclear Generating Station (OCNGS)
Docket No. 50-219
Combustible Gas Control

By letter dated March 13, 1987, the Staff stated its requirement that Oyster Creek be provided with an active pressurization and purge system that meets 10 CFR 50.44(g) by the time of restart from the Cycle 12R outage. The Staff's letter also requested plant-specific information concerning Oyster Creek's compliance with the combustible gas control requirements of 10 CFR 50.44(g), and transmitted its Safety Evaluation relating to Generic Letter 84-09 on recombiner capability requirements.

The compliance of BWR Mark I containment plants in general, and Oyster Creek in particular, with 10 CFR 50.44 has been the subject of extensive correspondence and meetings involving GPUN, other Mark I licensees, the BWR Owners Group, and the NRC Staff. Oyster Creek plant-specific information regarding compliance with 10 CFR 50.54(g) is discussed in Attachment A. A discussion of Oyster Creek's compliance with the technical criteria of Generic Letter 84-09 relating to 10 CFR 50.44(c)(3)(ii), including the Staff's Safety Evaluation, is provided in Attachment B.

As detailed in Attachments A and B, it is GPUN's position that the Oyster Creek facility meets the Generic Letter 84-09 criteria for determining that recombiner capability is not required in accordance with 50.44(c)(3)(ii). The attachments also demonstrate that Oyster Creek's inerted containment system, without the modifications set out in the Staff's Safety Evaluation, is safe and effective, and, in our view, provides full compliance with the requirements of 10 CFR 50.44(g). This position is consistent with the information communicated to the Staff by GPUN, the BWR Owners Group, and other BWR Mark I containment licensees.

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It is recognized that the GPUN position does not comply with the Staff's conclusion in its March 13, 1987 letter that an active pressurization and purge system is required to meet the requirements of 10 CFR 50.44. At present, a number of uncertainties exist with regard to the regulatory and technical basis for the Staff's conclusion. Uppermost among these uncertainties is that in its letter of March 13, 1987, the staff stated that "...a passive system, such as the inerted containment, is not sufficient alone to meet 10 CFR 50.44(g)...". Subsequently, the NRC's Office of General Counsel stated in its letter dated August 31, 1987 to the BWR Owners Group that "...it is reasonable to interpret 10CFR50.44(g) and 50.44(c)(i) so as not to preclude an inerted containment system from satisfying these regulations...". Additional uncertainties and misunderstandings which are apparent between the Staff and GPUN/BWR Owners Group/other BWR Mark I Containment Licensees are discussed in Attachment A.

The Staff has also asked a number of other BWR licensees with inerted Mark I containments to commit to the installation of an active pressurization and purge system in addition to their inerted containments. Oyster Creek, however, is unique in that it is the only plant for which the Staff has required the installation of an additional system by a stated time, the end of our next refueling cycle. Startup after the Cycle 12R outage is currently scheduled for December of this year. In view of GPUN's position that its inerted containment fully satisfies the requirements of 10 CFR 50.44(c)(3)(ii) and 10 CFR 50.44(g), the magnitude of the modifications identified by the Staff, and the significant regulatory uncertainties in need of generic resolution, it would be premature for GPUN to commit at this time to performing the modifications. Based on the above, GPUN requests that the staff's requirement for Oyster Creek to be provided with an active pressurization and purge system that meets 10 CFR 50.44(g) be deferred until final resolution between the Staff and GPUN/BWR Owners Group/other BWR Mark I containment licensees is obtained. In any event, as we have indicated in the recent May 25, 1988 discussion with the staff, planning and preparation for the upcoming 12R outage is well advanced and, given the significant engineering and procurement lead time required, it would not be possible to commit to performing the modifications during the 12R outage.

It is our understanding that the other BWR Mark I containment licensees who have been asked to commit to the installation of pressurization and purge systems have taken or intend to take positions similar to the GPUN position. We are continuing to work with the BWR Owners Group, and a submittal of the licensees' unified position is in preparation. GPUN recognizes that the current regulatory uncertainties we are experiencing have resulted from the evolutionary nature of complex issues, and we feel confident that, by working

closely with the Staff, the issues can be satisfactorily resolved. In view of these factors, as noted previously, we request deferral of the unique schedule requirement currently imposed on GPUN to perform modifications during the 12R outage and propose instead that the issues be resolved for Oyster Creek in concert with the overall resolution for the BWR Owners Group of which we are a member. We are prepared to meet with the Staff at your convenience to discuss this matter further. If you have any questions regarding this submittal, please contact Mr. M. W. Laggart at (201)316-7968.

Very truly yours,

R. F. Wilson
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Attachment A
Oyster Creek Nuclear Generating Station
Compliance with 10 CFR 50.44(g)

Inerted Containment - Compliance with 10 CFR 50.44(g)

The primary means of combustible gas control at Oyster Creek is its inerted containment. It is GPUN's position that the inerted containment of the Oyster Creek facility provides a safe and effective means of combustible gas control following a LOCA, that the inerted containment is in full and effective compliance with the requirements of 10 CFR 50.44(g), and that the installation of an additional system for gas control or modifications to existing systems are therefore not required.

The combustible gas control requirement in 10 CFR 50.44(g), in conjunction with 10 CFR 50.44(c)(3)(i), is applicable to Oyster Creek. Section 50.44(c)(3)(i) requires an inerted containment for all plants with BWR Mark I containments. Section 50.44(g) requires the use of a combustible gas control system designed to conform with the general requirements of General Design Criteria 41, 42 and 43.

The Staff determined in its March 13, 1987 letter that Oyster Creek is in compliance with the inerted containment requirements of 10 CFR 50.44(c)(3)(i). The Oyster Creek inerted containment is in compliance with General Design Criteria GDC 41, 42 and 43 in all applicable respects, and therefore meets the requirements of 10 CFR 50.44(g).[1]

The adequacy of the inerted containment for combustible gas control has been demonstrated in the BWR Owners Group Report NEDO-22155, "Generation and Mitigation of Combustible Gas Mixtures in Inerted Mark I Containments," June 1982. NEDO-22155 shows that, for BWR plants with inerted Mark I containments, peak containment oxygen concentrations are maintained below the Regulatory Guide 1.7 combustible gas limits without requiring containment venting, containment repressurization, or hydrogen recombiners.

[1] As discussed below, a letter from the NRC's Office of the General Counsel states that a "technically acceptable inerted containment system" can satisfy the requirements of 10 CFR 50.44(g). The Staff has neither suggested to GPUN that the Oyster Creek inerted containment is not "technically acceptable" nor requested information concerning the technical acceptability of the inerted containment.

The Oyster Creek plant is bounded by the analysis presented in NEDO-22155. This was shown in GPUN's December 15, 1982 letter to the staff, and in a presentation to the staff at a meeting on April 10, 1986. In addition, the plant-specific features of Oyster Creek provide additional conservatisms when compared to the already conservative NEDO-22155 analysis. These conservatisms were presented at the April 10, 1986 meeting and documented in the staff's September 15, 1986 minutes of that meeting:

> The Oyster Creek core power (1971 MWt) is less than that of the NEDO-22155 reference plant (3359 MWt), and the Oyster Creek containment volume (180,000 cubic feet) is greater than the reference containment volume (159,000 cubic feet).
>
> The equivalent boiling time for the Oyster Creek limiting LOCA (100% for approximately 8 hours) is less than that assumed in the analysis (100% for 12 hours).

Staff Position - Regulatory Basis

The Staff has taken the position in its March 13, 1987 letter that, in addition to the inerted containment, an active pressurization and purge system should be installed to meet the requirements of 10 CFR 50.44(g). In the accompanying Safety Evaluation for Generic Letter 84-09, the Staff reached a similar conclusion, but cited a different regulatory basis, stating that such a system (and other modifications) is required to satisfy the technical criteria of the generic letter with respect to 10 CFR 50.44(c)(3)(ii). In either case, however, there now exists considerable uncertainty as to the regulatory basis for such a requirement.

Subsequent to the March 13, 1987 letter and Safety Evaluation, in a letter dated August 31, 1987 to the BWR Owners Group, the NRC's Office of the General Counsel stated that sections 50.44(g) and 50.44(c)(3)(i) can be satisfied with a "technically acceptable inerted containment system."[2]

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[2] The opinion of the Office of the General Counsel was in response to a letter dated June 23, 1987 from the BWR Owners Group with respect to a "technically acceptable inerted containment system," which was specifically defined as a system consisting of "valves, piping and other equipment associated with the containment boundary out to and including the first isolation valve necessary to operate after a design basis LOCA to provide reasonable assurance that, with the inerted containment required by technical specifications, concentrations of combustible gases within the containment will be maintained below flammable limits."

This is consistent with the language of Section 50.44(g) which does not require the use of any specific type of system, such as a pressurization and purge system or recombiners, does not preclude the use of an inerted containment to satisfy its requirements, and does not require the use of a system in addition to an inerted containment.

The opinion of the Office of the General Counsel has the effect of reopening the earlier Staff determination that satisfaction of 10 CFR 50.44(g) requires both an inerted containment and a pressurization and purge system designed to conform with the general requirements of GDC 41, 42 and 43.

The requirements of Section 50.44(g) for Oyster Creek are not expanded by 10 CFR 50.44(c)(3)(ii), as implemented by Generic Letter 84-09, to require the addition of a pressurization and purge system. Section 50.44(g), which existed prior to enactment of Section 50.44(c)(3)(ii) in 1981, allows (but does not require) the use of pressurization and purge system for combustible gas control at Oyster Creek. The reason for adding section 50.44(c)(3)(ii) was to "reduce the likelihood of venting radioactive gases following an accident" by requiring the addition of recombiner capability for those plants which rely primarily on a purge/repressurization system. See Federal Register, Vol. 46, p. 58484, December 2, 1981, and Vol. 45, p. 65468, October 2, 1980. Because Oyster Creek has an inerted containment and does not rely upon a pressurization and purge system as the primary means of controlling combustible gases following a LOCA, the addition of section 50.44(c)(3)(ii) did not impose additional combustible gas control requirements on the facility. Construing section 50.44(c)(3)(ii) (or Generic Letter 84-09) to require the installation of a pressurization and purge system would be contrary to the language and the stated intent of both the regulation and the generic letter.[3]

[3] Statements in the March 13, 1987 Safety Evaluation, and in an August 12, 1986 letter to Northeast Nuclear Energy Company (NNECO) with respect to Millstone 1, characterize Generic Letter 84-09 as requiring a pressurization and purge system to satisfy the technical criteria for recombiner relief. Those statements are inconsistent with both the intent and language of the generic letter.

Staff Position - Technical Basis

There are also several significant areas of uncertainty concerning the Staff's technical basis for imposing the requirement for a pressurization and purge system to satisfy 10 CFR 50.44(g). In the Staff's summary of a meeting held on January 20, 1987 with members of the BWR Owners Group, transmitted to GPUN by separate cover letter dated March 13, 1987, the Staff noted that GPUN should use Regulatory Guide 1.7 to calculate the generation of combustible gases during a LOCA, rather than NEDO-22155, upon which the Oyster Creek position is based. GPUN presumes this to be the primary reason for requiring the installation of an active pressurization and purge system. Contrary to the implication of that statement in the Staff's meeting summary, however, the methodology in NEDO-22155 (which uses a mechanistically derived oxygen generation rate) is consistent with the guidance of RG 1.7.

Page 1.7-3 of RG 1.7 provides the following with respect to the non-mechanistically derived values in Table 1:

> "Table 1 defines conservative values and assumptions that may be used to evaluate the production of combustible gases following a LOCA."

The NEDO-22155 study, taking into consideration recombination and other relevant factors, conservatively determined the net yield of oxygen generation in the inerted Mark I containment. This also is consistent with the guidance on page 1.7-3 of RG 1.7:

> "The rate of production of gases from radiolysis of coolant solutions depends on....(2) the net yield of gases generated from the solutions due to the absorbed radiation energy. Factors such as coolant flow rates and turbulence, chemical additives in the coolant, impurities, and coolant temperature can all exert an influence on the gas yields from radiolysis...." (Emphasis added by underscoring)

Thus, consideration of factors such as hydrogen/oxygen recombination are sanctioned by RG 1.7. Such considerations are not precluded by the regulations in section 50.44(g). In fact, as noted in its September 15, 1986 minutes of an April 10, 1986 meeting with GPUN, the Staff has accepted the NEDO-22155 net yield for oxygen generation as a basis for issuing Generic Letter 84-09.

While the Staff accepted the net yield oxygen values of the NEDO report as a basis for issuance of Generic Letter 84-09 (10 CFR 50.44(c)(3)(ii)), it did not accept them "for use in combustible gas calculations for the design basis LOCA" (10 CFR 50.44(g)). GPUN has several concerns with the uncertainties engendered by this position.

First, there does not appear to be a technical or regulatory basis for applying two different standards of compliance with the requirements of 10 CFR 50.44.

Second, the Staff indicated in a letter dated August 12, 1986 to Northeast Nuclear Energy Company (NNECO) concerning Millstone 1 that, with respect to "a narrow band of accident sequences," uncertainties associated with three factors--duration of boiling within the core, degree of fuel rod damage, and effect of water contamination on the oxygen generation process--were the bases for the staff's position that the RG 1.7 Table 1 oxygen generation rate, rather than the NEDO report net yield values, should be used to calculate the generation of oxygen during a design basis LOCA. Consideration of those factors, however, would appear to be inconsistent with 10 CFR 50.44(d)(1) which, for Oyster Creek, imposes the requirement to assume a metal-water reaction of approximately 1%. As such, the Staff's concerns would appear to relate to matters beyond the scope of 10 CFR 50.44.

Finally, the Staff's concerns have been addressed in NNECO's submittal of November 5, 1982. On the basis of the Staff's subsequent determination on November 1, 1984 that Millstone 1 satisfied the technical criteria of Generic Letter 84-09 and was in compliance with section 50.44(c)(3)(ii), GPUN had assumed that the matter had been resolved.[4] A review of NNECO's November 5, 1982 submittal shows the results of the Millstone I analysis are applicable to Oyster Creek. The Staff has not addressed any questions to GPUN or otherwise requested any information with respect to those factors.

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[4] NEDO-22155 was developed in cooperation with the licensees of BWR plants with inerted Mark I containments, and in particular was based on NNECO studies and analyses for Millstone 1. An extensive evaluation of combustible gas control for Millstone 1, submitted August 6, 1982, was available for Staff review contemporaneously with the NEDO report. The Staff concerns regarding the evaluation in NEDO-22155 were raised at a meeting with NNECO on September 15, 1982, and were addressed in NNECO's November 5, 1982 letter. The Staff later concluded, on November 1, 1984, that Millstone 1 satisfied the technical criteria of Generic Letter 84-09 and was in conformance with 10 CFR 50.44(c)(3). This determination was based on NNECO's response of July 17, 1984 which relied on the information that had been submitted in 1982. Subsequently, however, on August 12, 1986, the Staff stated that Millstone 1 would not be in compliance with the technical criteria of Generic Letter 84-09 unless it committed to install hydrogen recombiners or a purge/nitrogen repressurization system meeting the requirements of 10 CFR 50.44(g) (General Design Criteria 41, 42 and 43). In its October 15, 1986 response, NNECO indicated its understanding that its earlier submittals had resolved the Staff's concerns, and took the same position GPUN is taking here, that the inerted containment satisfies the requirements of 50.44 without the need or requirement for the installation of an additional system.

Reading the March 13, 1987 letter in the context of the accompanying Safety Evaluation lends further uncertainty to the present situation. While both the letter and the Safety Evaluation state the requirement for the additional combustible gas control system, the letter nevertheless asks for GPUN's plant specific position on Oyster Creek's compliance with section 50.44(g), and suggests that, under certain conditions, such a system may not be necessary.[5] This has led to uncertainty in the ability of GPUN to determine what may be required or acceptable. Moreover, as discussed in Attachment B, the Staff's technical basis for requiring the installation of a pressurization and purge system to meet the criteria of Generic Letter 84-09, is inconsistent with the characteristics of Oyster Creek's existing nitrogen/purge system. In any event, while the existing Oyster Creek system provides additional assurances of the effective control of combustible gases, that system is not relied upon by GPUN for compliance with the requirements of 10 CFR 50.44(g).

Conclusion

There are a number of uncertainties which raise issues that are yet to be resolved and which cast considerable doubt on the regulatory and technical bases for a requirement that an active purge and pressurization system is required for Oyster Creek. It is GPUN's position that, by virtue of the inerted containment, Oyster Creek, in its present configuration, is in full and effective compliance with the provisions of 10 CFR 50.44, including section 50.44(g).

[5] The March 13, 1987 letter from the Staff requested a discussion regarding the reliability and capability of the containment inerting system and the window of accident sequences for which this system would be effective in controlling combustible gases during a LOCA; and, a discussion regarding the time available until unacceptable concentrations are reached and the actions that would be taken to overcome the lack of redundancy in components and in providing power to the system.

Attachment B
Oyster Creek Nuclear Generating Station
Compliance with 10 CFR 50.44(c)(3)(ii) and Comments on
Generic Letter 84-09 Safety Evaluation

Generic Letter 89-04, May 8, 1984, set out the Staff's determination that, for purposes of compliance with 10 CFR 50.44(c)(3), Mark I BWR plants will be found to not rely upon pressurization and purge systems as the primary means of hydrogen control if three technical criteria are met. Issuance of the generic letter followed the Staff's review and acceptance of the BWR Owners Group studies documented in NEDO-22155, "Generation and Mitigation of Combustible Gas Mixtures in Inerted BWR Mark I Containments," June, 1982. The studies showed that, for all BWR plants with inerted Mark I containments, peak oxygen concentrations following a LOCA are maintained below the combustible gas limits without requiring venting or hydrogen recombiners.

GPUN demonstrated compliance of the three technical criteria for Oyster Creek in its letters of July 13, 1984, August 14, 1985, and June 16, 1985. Relevant information was also provided in GPUN letters to the Staff dated August 2, 1982, December 15, 1982, and September 24, 1985, and meetings with the Staff on April 10, 1986 and January 20, 1987. The Staff's March 13, 1987 Safety Evaluation for Oyster Creek relating to Generic Letter 84-09, however, states that Oyster Creek must rely on an active pressurization and purge system in addition to its inerted containment for compliance with the technical criteria of the generic letter, and provides that certain modifications are needed, including the installation of a nitrogen containment atmosphere dilution (NCAD) system which meets the General Design Criteria specified in 10 CFR 50.44(g).

No explanation is given in the Safety Evaluation for the statement that a pressurization and purge system is needed in addition to the inerted containment. As discussed in Attachment A, there is no regulatory basis for such a requirement in either section 50.44(g) or 50.44(c)(3)(ii), and there is no requirement for a pressurization and purge system in Generic Letter 84-09. A requirement to install such a system is inconsistent with the intent of section 50.44(c)(3)(ii) and the implementing generic letter.

The Staff's technical basis for the installation of the additional system to satisfy the technical criteria of the generic letter is briefly stated in a single paragraph on page 2 of the Safety Evaluation. It does not address the technical adequacy of the inerted containment, which is the means of combustible gas control at Oyster Creek. The Staff's technical basis consists primarily of characterizations of the Oyster Creek nitrogen/purge system and GPUN's position in responding to the technical criteria which are inconsistent with the GPUN submittals in a number of significant respects:

> Air is not supplied to the containment instrument systems during normal operation. GPUN's submittals dated July 13, 1984 and August 14, 1985 stated that, during normal operation, the Drywell Instrument Air/Nitrogen System (which performs all pneumatic functions in containment) is supplied with nitrogen. The drywell instrument nitrogen supply receives backup from instrument air such that, in the event of a loss of nitrogen pressure, the system automatically transfers to an air supply thus avoiding unnecessary plant transients. As described in GPUN's submittals of August 14, 1985 and June 16, 1985; the nitrogen/air supply to the containment uses the same penetration and containment isolation valves, thus any source of flow would be terminated upon containment isolation. The containment penetration is automatically isolated upon any of the following: low-low Rx water level, steamline high radiation, steamline break or steamline low pressure (in the run mode).
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> A non-safety grade NCAD does not provide the working medium for the containment instrument system once the containment is isolated. Upon automatic containment isolation, no flow (either nitrogen or air) is provided to the containment instrument system. The containment instrument system remains isolated as long as the containment isolation signal is present.
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> GPUN does not rely on a NCAD system to prevent combustible gas concentrations after a LOCA, and GPUN is not proposing to take credit for a non-safety grade NCAD system in satisfying the technical criteria of GENERIC LETTER 84-09. The criteria do not address the attributes of a NCAD system, and GPUN has therefore not responded to the generic letter by relying on such a system. As stated in submittals of August 14 and September 24, 1985, the primary means for combustible gas control at Oyster Creek is the inerted containment system.

In summary, considerable doubt exists as to both the regulatory and technical bases for the modifications identified in the Safety Evaluation for compliance with the technical criteria of Generic Letter 84-09. The BWR Owners Group Report NEDO-22155 demonstrated that peak combustible oxygen concentrations are maintained below the combustible gas limits without requiring containment venting or hydrogen recombiners. In addition, as discussed in Attachment A, Oyster Creek plant-specific features add additional conservatisms to the generic assumptions of NEDO-22155. Taking into consideration the BWR Owners Group report, GPUN's previous submittals, the clarifications of the Staff's Safety Evaluation discussed above, and GPUN's presentations at the meetings of April 10, 1986 and January 20, 1987, it continues to be the position of GPUN that Oyster Creek meets the technical criteria of Generic Letter 84-09 and is in full compliance with the requirements of 10 CFR 50.44.