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December 5, 2003

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Response to NRC Generic Letter 2003-01, "Control Room Habitability"

REFERENCE: (a) NRC Generic Letter 2003-01: Control Room Habitability, dated June 12, 2003

This letter provides Calvert Cliffs Nuclear Power Plant, Inc.'s response to the Nuclear Regulatory Commission's Generic Letter 2003-01 (Reference a). The Generic Letter was issued to request information that demonstrates compliance with current licensing and design bases, and applicable regulatory requirements for Control Room habitability.

The Nuclear Regulatory Commission requested a 180-day written response providing the requested information, or a 60-day written response if unable to provide the requested information, or if the requested completion date cannot be met. Attachment (1) to this letter contains Calvert Cliffs Nuclear Power Plant, Inc.'s 180-day response providing the requested information.

Should you have questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

GV/GT/bjd

Attachment: (1) Response to NRC Generic Letter 2003-01

cc: J. Petro, Esquire
J. E. Silberg, Esquire
Director, Project Directorate I-1, NRC
G. S. Vissing, NRC
H. J. Miller, NRC
Resident Inspector, NRC
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ATTACHMENT (1)

RESPONSE TO NRC GENERIC LETTER 2003-01

Calvert Cliffs Nuclear Power Plant, Inc.
December 5, 2003

Generic Letter 2003-01 Requested Information

All addressees are requested to provide the following information within 180 days of the date of this generic letter.

Requested Information 1

Provide confirmation that your facility's Control Room meets the applicable habitability regulatory requirements (e.g., GDC 1, 3, 4, 5, and 19) and that the CRHSs [control room habitability systems] are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases. Emphasis should be placed on confirming:

(a) That the most limiting unfiltered in-leakage into your CRE [Control Room envelope] (and the filtered in-leakage if applicable) is no more than the value assumed in your design basis radiological analyses for Control Room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.

(b) That the most limiting unfiltered in-leakage into your CRE is incorporated into your hazardous chemical assessments. This in-leakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the Control Room or the alternate shutdown panel in the event of smoke.

(c) That your Technical Specifications verify the integrity of the CRE, and the assumed in-leakage rates of potentially contaminated air. If you currently have a ΔP surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the American Society for Testing and Materials (ASTM) E741 testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your Technical Specification to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.

If your facility does not currently have a Technical Specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

CCNPP Response

Calvert Cliffs Nuclear Power Plant, Inc. assembled and reviewed the Control Room design and licensing bases and determined that it meets the applicable habitability regulatory requirements. The CCNPP Control Room habitability systems are designed, constructed, configured, operated, and maintained in accordance with the design and licensing bases.

Calvert Cliffs Nuclear Power Plant has one Control Room for both Units, which is designed to be maintained at neutral pressure. The CCNPP Control Room was designed and constructed to meet the intent of the draft General Design Criteria (GDC) issued on July 10, 1967, by the Atomic Energy Commission. The CCNPP construction permit was granted on July 7, 1969, based on the Preliminary Safety Analysis Report, which contained an assessment of CCNPP's compliance with the draft GDC. By the time the final GDCs were issued, we already had our construction permit; therefore, the final GDCs were not used to establish the principal design criteria for Calvert Cliffs. The response to the draft GDC criteria was later updated in the Final Safety Analysis Report (Reference 1) to reflect the implementation of the draft criteria in the final design of CCNPP.

Since the issuance of Reference 1, the CCNPP Control Room habitability licensing and design bases have been modified to meet additional regulatory requirements (NUREG-0737, Task Action Plan Item III.D.3.4) following the 1979 accident at Three Mile Island Nuclear Power Plant (References 2, 3, and 4). The licensing and design bases have also been modified as a result of commitments made to support license amendments (References 5 and 6) and modifications made under other appropriate regulatory criteria.

Calvert Cliffs was one of the first plants to use American Society for Testing and Materials (ASTM) Standard E-741 protocols for in-leakage testing in the mid-nineties. Since the initial testing identified excessive in-leakage, major modifications were implemented to reduce the amount of in-leakage. Subsequent testings performed over the years have demonstrated significant reduction in in-leakage.

"Emphasis" Item 1a

Confirm that the most limiting unfiltered in-leakage into your CRE (and the filtered in-leakage if applicable) is no more than the value assumed in your design basis radiological analyses for Control Room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.

The most limiting unfiltered in-leakage into the CCNPP Control Room is 3000+/-250 cubic feet per minute (CFM), which is less than the in-leakage value of 3500 CFM assumed in the CCNPP design basis radiological analyses.

The latest CCNPP Control Room tracer gas testing that resulted in the 3000+/-250 CFM unfiltered in-leakage was performed in January 2000. The 2000 test was performed by Nucon International, Inc. which is a 10 CFR Part 50, Appendix B vendor. The test determined the overall in-leakage into the Control Room via a Sulfur Hexaflouride (SF6) decay test per ASTM E-741 guidance. The Control Room test configuration was 100% continuous recirculation mode, which is the accident lineup. Subsequent informal tests have shown in-leakage values that are consistent with the 2000 test.

The interim CCNPP design basis radiological analysis that is currently credited in our Updated Final Safety Analysis Report (Reference 7) was completed in September 2000. The design basis analysis is based on Maximum Hypothetical Accident (MHA) and Fuel Handling Accident (FHA) with the following assumptions:

a. The atmospheric dispersion coefficient from the Containment to the Control Room was assumed to be 7.7E-4 (0-8 hours), 4.5E-4 (8-24 hours), 2.5E-4 (1-4 days), and 6.3E-5 (4-30 days). These values are based on three years of onsite data.

b. The Control Room volume is assumed to be 166,000 ft^3 in accordance with the design value.

c. The Control Room is in continuous recirculation (accident) mode with 3500 CFM of unfiltered leakage.

d. The Control Room recirculation filter flow starts at 2.1 seconds on high radiation signal. The portion of the recirculation flow which passes through the 90% efficient post-loss-of-coolant accident filters is 2,000$\pm$10% CFM.

e. The Control Room occupancy factors are assumed to be 1.0 (0-1 day), 0.6 (1-4 days), and 0.4 (4-30 days), per Standard Review Plan 6.4-19, Revision 2.

f. The self-contained breathing apparatus (SCBA) was assumed to have a Protection Factor of 10,000.

The radiological analyses concluded that the Control Room post-loss-of-coolant accident thyroid dose will be maintained below the (GDC 19) 30-day limit of 30 rem, if planned protective measures (SCBAs) are implemented within 32 minutes for MHA and 82 minutes for FHA. The use of SCBAs and Potassium Iodide (KI) tablets by the Control Room operators following an accident is consistent with Calvert Cliffs' Emergency Response Plan. There are sufficient SCBAs staged in the Control Room to provide protection to all Control Room operators following an accident and that additional SCBAs are staged elsewhere onsite for operators coming on-shift. The methodology employed for these analyses is contained in Chapters 9 and 14 of Reference 7. The calculated Control Room operator doses for the MHA and FHA are provided below in Tables 1 and 2, respectively.

Table 1

		MHA Dose (Rem)	Regulatory Limit (Rem)
Control Room In-leakage (CFM)		3500	
Control Room	Thyroid Dose	29.9	30
	Whole Body Dose	3.75	5
	Beta Skin Dose	28.6	30
Time to Don SCBAs (Minutes)		32.5	

Table 2

		FHA in Containment	FHA in Spent Fuel Pool	
		Design Basis FHA Dose (Rem)	Design Basis FHA Dose (Rem)	Regulatory Limit (Rem)
Control Room In-leakage (CFM)		3500	3500	
Control Room	Thyroid Dose	29.8	14.9	30
	Whole Body Dose	2.60	0.476	5
	Beta Skin Dose	1.15	1.30	30
Time to Don SCBAs (Minutes)		82	NA	

"Emphasis" Item 1b

Confirm that the most limiting unfiltered in-leakage into your CRE is incorporated into your hazardous chemical assessments. This in-leakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the Control Room or the alternate shutdown panel in the event of smoke.

The most limiting unfiltered in-leakage into the CCNPP Control Room is 3000+/-250 CFM, which is less than the in-leakage value of 8500 CFM, assumed in the CCNPP hazardous chemical assessments (Reference 8).

Based on a qualitative evaluation, we have concluded that a smoke event at CCNPP will not prevent the operators from initiating a safe shutdown of the plant (either unit) from either the Control Room or the unit's 45' Switchgear Room, alternate shutdown panel. The primary plant features and administrative/ procedural controls that support this conclusion are:

1. Existing systems and structures:
   - heating, ventilation, and air conditioning (HVAC) and smoke removal systems
   - physical plant barriers and barrier configurations
   - adequately arranged and redundant egress pathways
   - smoke detection and fire suppression systems
   - automatic operating dampers to control smoke migration
2. Manual ventilation capabilities; and
3. Locally installed and readily accessible SCBA units for use as a short-term compensatory measure to allow Operators to remain in the Control Room or at the alternate shutdown panel if necessary

"Emphasis" Item 1c

... If your facility does not currently have a Technical Specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

Calvert Cliffs does not currently have a Technical Specification surveillance requirement for CRE integrity. Calvert Cliffs has established a comprehensive administrative control program for CRE integrity based on the applicable portions of Regulatory Guides 1.78 (Revision 1), 1.196, 1.197, and Nuclear Energy Institute 99-03 (Revision 1). The program includes CRE barrier/breach control, periodic programmatic assessments, CRE integrity verification, hazardous chemical control, and maintenance. The program, which is a controlled plant procedure, is adequate to demonstrate CRE integrity because the performance standards and evaluation frequencies generally meet or exceed industry and NRC guidance for CRE integrity.

Control Room envelope integrity verification is accomplished through periodic in-leakage testing, surveillance testing, and performance evaluations. Our in-leakage testing is performed once every six years in accordance with the requirements of ASTM E-741 standards. It is an integrated test that determines the total in-leakage into the CRE. The acceptance criteria for the test are based on the most limiting radiological and toxic gas analyses and supports the qualitative smoke event evaluation. Additionally, periodic system walkdowns are conducted in accordance with plant procedures. The Control Room HVAC system manager inspects the CRE during the Control Room HVAC walkdowns

and initiates corrective actions as necessary per our corrective action procedures for any deficiencies identified.

Calvert Cliffs Technical Specification 3.7.8 controls the Control Room Emergency Ventilation System. Surveillance testing of the Control Room Emergency Ventilation System components is conducted to verify system operability. Although the Control Room Emergency Temperature System (Technical Specification 3.7.9) is not specific to habitability, many of the components are the same and the associated surveillance requirements aid in verifying CRE integrity.

Requested Information 2

If you currently use compensatory measures to demonstrate Control Room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.

CCNPP Response

As described above, SCBAs and a thyroid blocking agent KI are currently used as interim compensatory measures to demonstrate the Calvert Cliffs Control Room habitability.

Corrective actions needed to retire these compensatory measures

Our evaluation has determined that a reanalysis of applicable Updated Final Safety Analysis Report, Chapter 14 accidents using Alternate Source Term per Regulatory Guide 1.183, combined with targeted sealing of the Control Room envelope, will be needed to retire the interim compensatory measures. A sensitivity study is being performed on six accidents to determine possible corrective actions necessary to achieve the required Total Effective Dose Equivalent of 5 Rem to the Control Room operators without compensatory measures. Our current plan calls for completing the formal reanalysis of the applicable accidents using Alternate Source Term and submittal of a license amendment request to the NRC by November 30, 2004. Associated modifications will be implemented once the submitted analyses are approved, with a goal of completing the implementation by December 2005. If any of the modifications require an outage, our goal is to complete implementation by June 2006. Possible analytical input changes being considered include: reducing overall Containment leakage (L_a) and adding filtration to the refueling water tank vent line, taking additional credit for various Technical Specification charcoal/high efficiency particulate air filters, and reducing in-leakage pathways into the Auxiliary Building during accident scenarios.

Requested Information 3

If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding Control Room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.

CCNPP Response

Not Applicable.

REFERENCES

1. Calvert Cliffs Nuclear Power Plant, Unit 1 and 2, Final Safety Analysis Report, January 1971
2. Letter from C. H. Poindexter (BGE) to D. G. Eisenhut (NRC), dated December 30, 1980, Response to NUREG-0737

3. Letter from A. E. Lundvall, Jr. (BGE) to R. A. Clark (NRC), dated July 27, 1982, NUREG-0737 Item III.D.3.4
4. Letter from R. E. Denton (BGE) to Document Control Desk (NRC), dated May 6, 1993, Control Room Habitability – Interim Engineering Analysis for Thyroid Dose
5. Letter from D. G. McDonald, Jr. (NRC) to R. E. Denton (BGE), dated August 31, 1994, Issuance of Amendments for Calvert Cliffs Nuclear Power Plant (License Amendment Nos. 194 and 171)
6. Letter from A. W. Dromerick (NRC) to C. H. Cruse (BGE), dated May 23, 1998, Issuance of Amendments for Calvert Cliffs Nuclear Power Plant, Unit No. 1 (TAC No. M97855) and Unit 2 (TAC No. M97856)
7. Calvert Cliffs Nuclear Power Plant, Unit 1 and 2, Updated Final Safety Analysis Report, Revision 33
8. Letter from C. H. Cruse (BGE) to Document Control Desk (NRC), dated August 17, 1999, Request for Additional Information Regarding Baltimore Gas and Electric Company Toxic Gases Calculation for Control Room Habitabilty