

ROBERT E. DENTON
Vice President
Nuclear Energy

Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657
410 586-2200 Ext. 4455 Local
410 260-4455 Baltimore



March 31, 1994

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 Verbal Request for Additional Information; Proposed Revision
to Calvert Cliffs Nuclear Power Plant Emergency Action Levels (TAC
Nos. M87080; M87081)

Reference (a) provided you with our proposed changes to Emergency Action Levels (EALs) which reflect the guidance in NUMARC/NESP-007, Revision 2, "Methodology for Development of Emergency Action Levels," and Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Reactors." Reference (b) is the NRC Staff request for additional information that is necessary to complete the review of our proposed changes. Reference (c) is our response to that request. Subsequent to Reference (c), NRC and Baltimore Gas and Electric Company (BGE) staff communicated via telephone (References d and e) to discuss BGE's response. In keeping with these discussions, the attached revised excerpt (seven pages) from the Calvert Cliffs EAL Basis Document is provided.

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

Very truly yours,

RED/JMO/dlm

Attachment

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
R. A. Capra, NRC
D. G. McDonald, Jr., NRC
T. T. Martin, NRC
P. R. Wilson, NRC
R. I. McLean, DNR
J. H. Walter, PSC

07002
9404110188 940331
PDR ADOCK 05000317
F PDR

A045
11

- REFERENCES:
- (a) Letter from Mr. R. E. Denton (BGE) to NRC Document Control Desk, dated July 20, 1993, Emergency Action Level Scheme
 - (b) Letter from Mr. D. G. McDonald, Jr. (NRC) to Mr. R. E. Denton (BGE), dated November 17, 1993, Request for Additional Information Regarding Proposed Emergency Action Levels of the Site Emergency Plan, Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. M87080; M87081)
 - (c) Letter from Mr. R. E. Denton (BGE) to NRC Document Control Desk, dated March 11, 1994, Response to Request for Additional Information (TAC Nos. M87080; M87081)
 - (d) Telephone Conference between D. G. McDonald, Jr. and S. A. Boynton (NRC); J. M. Osborne and T. E. Forgette (BGE), on March 17, 1994, Verbal Request for Additional Information
 - (e) Telephone Conferences between S. A. Boynton (NRC) and T. E. Forgette (BGE), various dates, Verbal Request for Additional Information

ATTACHMENT

CALVERT CLIFFS NUCLEAR POWER PLANT
EMERGENCY ACTION LEVEL BASIS DOCUMENT

PAGES

B:16

E:1

T:1

T:2

T:3

N:2

N:4

Baltimore Gas and Electric Company

Docket Nos. 50-317 & 50-318

April 4, 1994

FISSION PRODUCT BARRIER DEGRADATION

This corresponds to a dose rate of 0.4 mSv/h. Per Reference 3, this also results in a dose rate at one foot from an *unshielded RCS sample* of about 168 mrem/h. (1.7 mSv/h).

The plant-specific containment monitor radiation values were determined from ERPIP-801, assuming 5% fuel clad damage. This procedure can be used to determine the containment radiation monitor readings resulting from 5% fuel clad failure using Attachment 2 and assuming no power correction.

The radiation monitor reading (1-RI-5317A & B, 2-RI-5317 A & B) corresponding to 5% fuel clad failure at 2 hours after shutdown is about 3,500 rem/h (35 Sv/h).

Thus, Loss EAL 2 is written as:

Valid RI-5317A/B Reading of AT LEAST 3,500 rem/h Within 2 Hours After Reactor Shutdown

Valid means that the applicable radiation monitoring channel(s) are considered to be operable in accordance with the Technical Specifications.

The EAL uses the value of 2 hours after the initiating event (assumed to closely correspond to the time of reactor shutdown) for simplicity in presentation to the Shift Supervisor acting as the Site Emergency Coordinator (SEC). The two hour point was also picked because it allows ample time for transfer of the SEC duties to outside the Control Room.

Technical support personnel can also use ERPIP-801, -802, -803, and -804 to determine core damage. Thus, Loss EAL 3 is written as:

AT LEAST 5% Fuel Clad Damage As Determined From Core Damage Assessment

For fuel clad loss indicated by radiochemical analysis: Calvert Cliffs reactor coolant concentrations at the NUMARC value (300 $\mu\text{Ci/cc DEQ I}^{131}$) correspond to about 1% clad failure. This is below the NUMARC clad damage range of 2-5% and is not beyond the range of a worst case I^{131} spike following a reactor trip. To ensure emergency declarations do not result from trip induced iodine spikes, the low end of the NUMARC clad damage range was selected for site specific application. As addressed previously, calculations from various coolant radionuclide concentrations for 5% gap release correspond to about 1500 $\mu\text{Ci/cc DEQ I}^{131}$. Ratioing this to 2% clad loss results in reactor coolant concentrations corresponding to 600 $\mu\text{Ci/cc DEQ I}^{131}$.

Thus, Loss EAL 4 is written as:

Coolant Activity GREATER THAN 600 $\mu\text{Ci/cc DEQ I}^{131}$.

Source Documents/References/Calculations:

1. Technical Specifications
 - Figure 3.4.8-1, Dose Equivalent I-131 Primary Coolant Specific Activity Limit Versus Percent of Rated Power With the Primary Coolant Specific Activity > 1.0 $\mu\text{Ci/Gram Dose Equivalent I-131}$
2. Emergency Response Plan Implementation Procedures
 - ERPIP-801, Core Damage Assessment Using Containment Radiation Dose Rates
 - ERPIP-802, Core Damage Assessment Using Core Exit Thermocouples
 - ERPIP-803, Core Damage Assessment Using Hydrogen
 - ERPIP-804, Core Damage Assessment Using Radiological Analysis of Samples
3. BG&E Fuel Degradation EALs Calculation Worksheet, JSB Associates, February 18, 1993

ELECTRICAL

Emergency Classification Level: UNUSUAL EVENT

Applicable Operational Modes: ALL

Calvert Cliffs Initiating Condition:

EU1 Loss of Off-Site Power

NUMARC Recognition Category: System Malfunction

NUMARC Initiating Condition:

SU1 Loss of All Off-Site Power to Essential Busses for Greater Than 15 Minutes

Barrier: Not Applicable

NUMARC Generic Basis:

Prolonged loss of AC power reduces required redundancy and potentially degrades the level of safety of the plant by rendering the plant more vulnerable to a complete Loss of AC Power (Station Blackout). Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Multi-unit stations with shared safety functions should further consider how this IC may affect more than one unit and how this may be a factor in escalating the emergency class.

Plant-Specific Information:

Procedure EOP-2, Loss of Off-Site Power, would be implemented under the conditions of concern. AOP-3F applies to the other operational modes when the plant is critical. Per EOP-2, the following are symptoms of a loss of off-site power:

- Momentary loss of Control Room lighting on both Units.
- 500KV Red Bus and Black Bus power available lights are de-energized.
- Diesel Generators automatically start.
- 13KV Service Buses 12 and 22 power available lights are de-energized.
- No RCPs are running on either Unit.
- Reactor Trip occurs due to RCS low flow.

For consistency with procedural requirements and to reflect potential severity, separate EALs have been developed for hot and cold conditions. With the plant initially operating in Mode 1 or 2, EOP-2 would be entered on a loss of off-site power. Under these conditions, restoring off-site power is expected to take no less than 15 minutes based on procedure implementation. Therefore, EAL 1 does not use the generic 15 minute threshold. EOP-2 may also be implemented if single phase natural circulation is to be used for RCS heat removal although at least one 13KV Service Bus is energized. Unusual Event declaration is not appropriate for this use of the procedure.

Thus, EAL 1 is written as:

EOP-2, Loss of Off-Site Power, Implemented On Either Unit for loss of offsite power.

EAL 2 addresses loss of off-site power when EOP-2 does not apply.

Thus, EAL 2 is written as:

Loss of Off-Site Power for GREATER THAN 15 Minutes

SECURITY

Emergency Classification Level: UNUSUAL EVENT

Applicable Operational Modes: ALL

Calvert Cliffs Initiating Condition:

TU1 Confirmed Security Event With Potential Degradation in the Level of Safety of the Plant

NUMARC Recognition Category: Hazards and Other Conditions Affecting Plant Safety

NUMARC Initiating Condition:

HU4 Confirmed Security Event Which Indicates a Potential Degradation in the Level of Safety of the Plant

Barrier: Not Applicable

NUMARC Generic Basis:

This EAL is based on (Site-specific) Site Security Plan. Security events which do not represent at least a potential degradation in the level of safety of the plant are reported under 10 CFR 73.71 or in some cases under 10 CFR 50.72. The plant Protected Area Boundary is typically that part within the security isolation zone and is defined in the (Site-specific) security plan. Bomb devices discovered within the plant Vital Area would result in < escalation > to a higher emergency classification level via other Security Event ICs>.

Plant-Specific Information:

The Calvert Cliffs EALs address the generic areas of concern and include the ISFSI. Attempted intrusion means that intruders are not successful in getting past the innermost fence of the double fence that surrounds the plant protected area. Sabotage within the ISFSI includes discovery of a bomb device. Intruders are armed or unarmed personnel that are attempting to or have gained unauthorized access in a hostile manner.

Sabotage (including discovery of a bomb device) inside the Plant Protected Area warrants escalation to an Alert level emergency. A Site Emergency is warranted if sabotage occurs in an area of concern for safe shutdown of either reactor. Thus, EAL 1 is written as:

"Security Emergency" or "Security Alert" Declared for Attempted Intrusion into the Plant Protected Area

EAL 2 is written as:

"Security Event" Declared for:

- Sabotage Within or to ISFSI Protected Area
- Intrusion Into ISFSI Protected Area

Source Documents/References/Calculations:

None

SECURITY

Emergency Classification Level: **ALERT**

Applicable Operational Modes: **ALL**

Calvert Cliffs Initiating Condition:

TA1 Security Event in the Plant Protected Area

NUMARC Recognition Category: Hazards and Other Conditions Affecting Plant Safety

NUMARC Initiating Condition:

HA4 Security Event in a Plant Protected Area

Barrier: Not Applicable

NUMARC Generic Basis:

This class of security events represents an escalated threat to plant safety above that contained in the Unusual Event. For the purposes of this IC, a civil disturbance which penetrates the protected area boundary can be considered a hostile force. Intrusion into a vital area by a hostile force will escalate this event to a Site <Emergency>.

Plant-Specific Information:

The Calvert Cliffs EALs address the generic areas of concern. Sabotage includes discovery of a bomb device. Intruders are armed or unarmed personnel that have gained unauthorized access in a hostile manner. Thus, EAL 1 is written as:

"Security Emergency" or "Security Alert" Declared For:

- Intrusion into the Plant Protected Area
- Sabotage inside the Plant Protected Area

Source Documents/References/Calculations:

None

SECURITY

Emergency Classification Level: SITE EMERGENCY

Applicable Operational Modes: ALL

Calvert Cliffs Initiating Condition:

TS1 Security Event in a Plant Vital Area

NUMARC Recognition Category: Hazards and Other Conditions Affecting Plant Safety

NUMARC Initiating Condition:

HS1 Security Event in Plant Vital Area

Barrier: Not Applicable

NUMARC Generic Basis:

This class of security events represents an escalated threat to plant safety above that contained in the Alert IC in that a hostile force has progressed from the Protected Area to the Vital Area. < >

Plant-Specific Information:

The Calvert Cliffs EALs address the generic areas of concern. Sabotage includes discovery of a bomb device. Intruders are armed or unarmed personnel that have gained unauthorized access in a hostile manner.

Thus, EAL 1 is written as:

Intrusion into an area of the plant that is a concern for safe shutdown of either reactor.

EAL 2 is written as:

Sabotage within an area of the plant that is a concern for safe shutdown of either reactor.

The list of areas of concern for Safe Shutdown are shown below and are prominently displayed on the EAL Table.

Areas of Concern for Safe Shutdown	
<ul style="list-style-type: none">• Control Room• Control Room HVAC Room• Cable Spreading Room• Cable Chases• Switchgear Room• ECCS Pump Room• Service Water Pump Room• Component Cooling Pump Room• Main Steam Penetration Room	<ul style="list-style-type: none">• Electrical Penetration Rooms• Auxiliary Feedwater Pump Room• Charging Pump Rooms• Diesel Generator Rooms• Refueling Water Tank (RWT) 11(21)• Condensate Storage Tank (CST) 12• Pretreated Water Storage Tank (PWST) 11(21)• Fuel Oil Storage Tank (FOST) 12
This list of Safe Shutdown areas is displayed on the EAL Tables to assure that all areas related to Safe Shutdown are considered by the SEC.	

Source Documents/References/Calculations:

None

NATURAL HAZARDS

EAL 2 is written as:

Nuclear Security Report of a Tornado Striking Switchyard, Plant Protected Area Or Within ISFSI Protected Area

Per UFSAR Section 2.8.3.4, the design basis hurricane (used for tidal surge estimates) has a maximum wind speed of 124.7 MPH and a forward speed of 23 MPH. EAL 3 uses 75 MPH to be anticipatory of the design basis wind speed.

Thus, EAL 3 is written as:

Sustained Wind Speed GREATER THAN 75 MPH (34 Meters/Second) for AT LEAST 15 Minutes

The duration of 15 minutes is selected to indicate sustained winds and to preclude wind gusts. An increase in sustained speed above 90 mph (40 meters/second) is cause for escalation to an Alert. Wind speeds are also provided here in meters/second for dose assessment input. The conversion equation is as follows:

$$75 \text{ miles/hour} \times 5280 \text{ feet/mile} \times (1 \text{ hour}/3600 \text{ seconds}) \times 1 \text{ meter}/3.2808 \text{ feet} = 34 \text{ meters/second}$$

Per UFSAR Section 2.8.3.6, the still water level used for Intake Structure analysis is 17.6 feet MSL. This is above the top of the range of the Tide Level Recorder (0-LR-5195). The top of the Intake Structure flood lights (located on the east side to the traveling screens) is 15 to 16 feet MSL. EAL 4 is anticipatory of the design water level.

Thus, EAL 4 is written as:

Bay Water Level Above the Top of the Intake Structure Flood Lights On East Side of Traveling Screens

Per UFSAR Section 2.8.3.7, the predicted extreme low tide is -3.6 feet MSL and normal operation can continue with the bay level as low as -4.0 feet MSL.

Thus, EAL 5 is written as:

Bay Water Level Is AT LEAST 3.6 Feet Below Mean Sea Level

Surveillance Test Procedures provide a way to determine Bay level.

Source Documents/References/Calculations:

1. Updated Final Safety Analysis Report
2. Operating Instruction (OI) 46. Seismic Measurement Equipment
3. BG&E Drawing 60-220-E (M-31), Equipment Location Service Building, Water Treatment Area & Intake Structure Section "J-J"
4. BG&E Drawing 83-278-E, Plan Auxiliary Building Restricted Access Area El. (-)8'-0", (-)10'-0" And (-)15'-0"
5. BG&E Internal Memorandum, J.E. Thorp to R.E. Denton, Emergency Action Level Review Criteria, June 1, 1990
6. Letter, G.C. Creel (BG&E) to U.S. Nuclear Regulatory Commission Document Control Desk, Emergency Action Level Revision, September 24, 1992

NATURAL HAZARDS

EAL 2 is written as:

Verified Report to Control Room of Visible Damage to Safe Shutdown Equipment

Verification of damage can be by physical observation, or by indications of degraded equipment performance in the Control Room or at local control stations.

EAL 3 uses a sustained wind speed of 90 MPH to address high winds striking the Plant Vital Area as recommended by NUMARC. This speed is chosen to assure that the wind speed is within the design capability of the meteorological tower.

Thus, EAL 3 is written as:

Sustained Wind Speed GREATER THAN 90 MPH (40 Meters/Second) for AT LEAST 15 Minutes

The duration of 15 minutes is selected to indicate sustained winds and to preclude wind gusts. Wind speeds are also provided here in meters/second for dose assessment input. The conversion equation is as follows:

$$90 \text{ miles/hour} \times 5280 \text{ feet/mile} \times (1 \text{ hour}/3600 \text{ seconds}) \times 1 \text{ meter}/3.2808 \text{ feet} = 40 \text{ meters/second}$$

Per UFSAR Section 2.8.3.6, the still water level used for Intake Structure analysis is 17.6 feet MSL. This is above the top of the range of the Tide Level Recorder (0-LR-5195). The top of the Traveling Screen cover housings is about 18 feet MSL. EAL 4 indicates achieving the design water level.

Thus, EAL 4 is written as:

Bay Water Level At Or Above the Top of the Traveling Screen Cover Housing

Per UFSAR Section 2.8.3.7, the predicted extreme low tide is -3.6 feet MSL and the plant is designed to safely operate at an extreme low water level of -6.0 feet MSL. EAL 5 is based on the lower elevation.

Thus, EAL 5 is written as:

Bay Water Level Is AT LEAST 6 Feet Below Mean Sea Level

Surveillance Test Procedures provide a way to determine Bay level.

Source Documents/References/Calculations:

1. Updated Final Safety Analysis Report
2. Operating Instruction (OI) 46, Seismic Measurement Equipment
3. BG&E Drawing 60-220-E (M-31), Equipment Location Service Building, Water Treatment Area & Intake Structure Section "J-J"
4. BG&E Internal Memorandum, J.E. Thorp to R.E. Denton, Emergency Action Level Review Criteria, June 1, 1990