10CFR50.54(f)

PECO NUCLEAR
A UNIT OF PECO ENERGY

PECO Energy Company
Nuclear Group Headquarters
965 Chesterbrook Boulevard
Wayne, PA 19087-5691

April 22, 1998

Docket No. 50-277
50-278

License No. DPR-44
DPR-56

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

SUBJECT: Peach Bottom Atomic Power Station, Units 2 and 3
Response to Request for Additional Information Regarding Review of Individual Plant Examination of External Events

REFERENCES: (1) Letter from L. Mark Padovan, U. S. NRC to G. A. Hunger, PECO Energy Company, dated November 12, 1997

(2) Letter from G. A. Hunger, PECO Energy Company, to U. S. NRC dated December 22, 1997.

Dear Sir:

Your request for additional Information (RAI) which was transmitted by the reference (1) letter requested a response within 60 days. Our reference (2) letter proposed a response by April 1998. Attached is our response to your RAI. Attachment 1 to this letter provides a restatement of the questions, followed by our response. The response to seismic questions 1 and 7 commit to providing a response by August 1998. This resulted from our review of high confidence in low probability of failure (HCLPF) calculations and the need for their revision. An accurate response to these questions can be submitted by August 1998.

If you have any questions, please contact us.

Very truly yours,

Garrett D. Edwards
Director - Licensing

Enclosure: Affidavit, Attachment 1

cc: H. J. Miller, Administrator, Region I, USNRC
A. C. McMurtray, USNRC Senior Resident Inspector, PBAPS

A011

COMMONWEALTH OF PENNSYLVANIA:

: SS

COUNTY OF CHESTER :

J. B. Cotton, being first duly sworn, deposes and says:

That he is Vice President of PECO Energy Company, the Applicant herein; that he has read the enclosed response to the NRC request for additional information concerning the Peach Bottom Atomic Power Station Individual Plant Examination of External Events, and knows the contents thereof; and that the statements and matters set forth therein are true and correct to the best of his knowledge, Information and belief.

John B. Cotton

Vice President

Subscribed and sworn to

before me this 22nd day

of April 1998.

Carol A. Walton

Notary Public

NOTARIAL SEAL
CAROL A. WALTON, Notary Public
City of Philadelphia, Phila. County
My Commission Expires May 28, 2001

ATTACHMENT 1

Docket Nos. 50-277
50-278

License Nos. DPR - 44
DPR - 56

Response to Request for Additional Information
Peach Bottom Atomic Power Station, Units 2 and 3
Individual Plant Examination of External Events (IPEEE)

A. SEISMIC ANALYSIS

Question

1. A reduced-scope evaluation was performed instead of the recommended focused-scope (or modified focused-scope) evaluation. No high confidence in low probability of failure (HCLPF) capacities were reported for the plant or key components that may control the plant capacity. The most apparent consequences of this deficiency are: (a) plant capability in the face of beyond-design-basis earthquakes has not been demonstrated; and (b) an appreciable understanding has not been obtained of the most important components that act to limit the seismic capability of the plant. Please identify the key components that control the HCLPF capacity of each of the selected success paths, report the HCLPF capacities for these components, and submit HCLPF calculations for the controlling set of components having capacities less than the 0.3g review level earthquake (RLE) recommended in NUREG-1407.

Response

1. The response to this question will be provided by August 1998.

Question

2. The submittal has not presented a list of the masonry/block walls whose failure could interact with: success path component list (SPCL) components; components needed to maintain early containment integrity; components whose failure could induce a fire, flood, or release of harmful chemicals; or components needed for fire suppression. The submittal references calculations that demonstrate block wall seismic design adequacy, but does not describe the approach and results of such calculations. Furthermore, Supplement No. 5 of Generic Letter 88-20 requests that seismic margins assessment evaluations of block walls affecting safety equipment be performed for focused-scope plants at the RLE value of 0.3g, rather than at the safe-shutdown earthquake (SSE). Please provide a list of masonry block walls potentially affecting safety equipment, report their HCLPF capacities, and submit capacity calculations for a bounding (lowest capacity) case.

Response

2. The masonry block walls that are in the vicinity of safety related equipment were reviewed using drawings and design calculations to determine the critical walls to be analyzed. The critical walls were analyzed using the methods outlined in Appendix R of EPRI NP-6041, "A Methodology for Assessment of Nuclear Power Plant Seismic Margin." The critical walls selected and their HCLPF capacities are listed below:

Wall	Location	HCLPF
40.2	Turbine Building Elev. 135'-0"	0.47g
68.4	Turbine Building Elev. 150'-0"	0.37g
412.1	Reactor Building Elev. 180'-0"	0.48g
406.2	Reactor Building Elev. 135'-0"	0.20g

Wall 406.2 is representative for wall 406.1 in Unit 3 and walls 45.1 and 45.2 in Unit 2; therefore, all four of these walls have the same HCLPF. The location of these four walls are shown in attached Figures S.2-1 and 2.

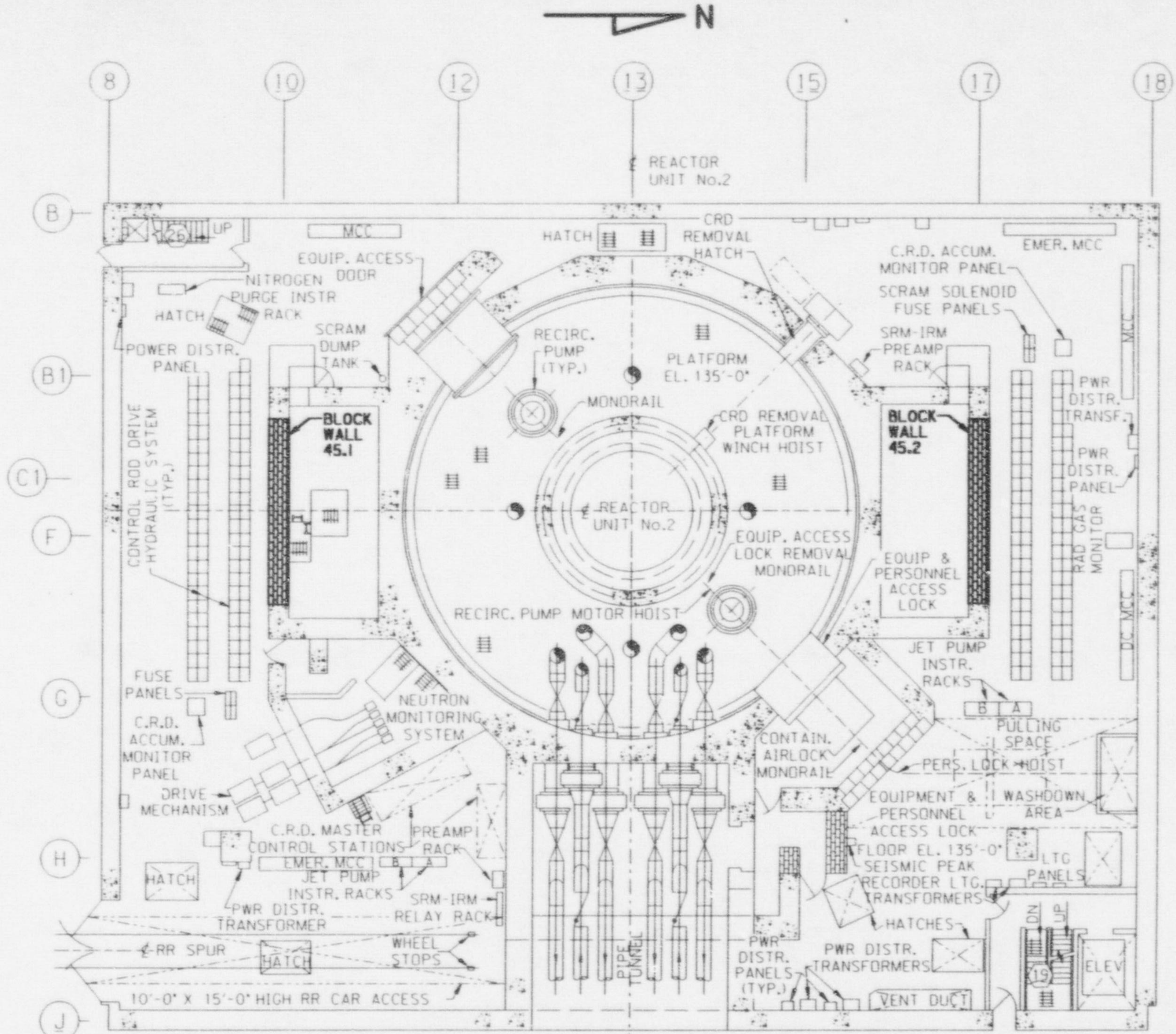

Figure S.2-1 REACTOR BLDG. UNIT #2 EL. 135'-0"

EXCERPT FROM DRAWING M-3, SH. 1

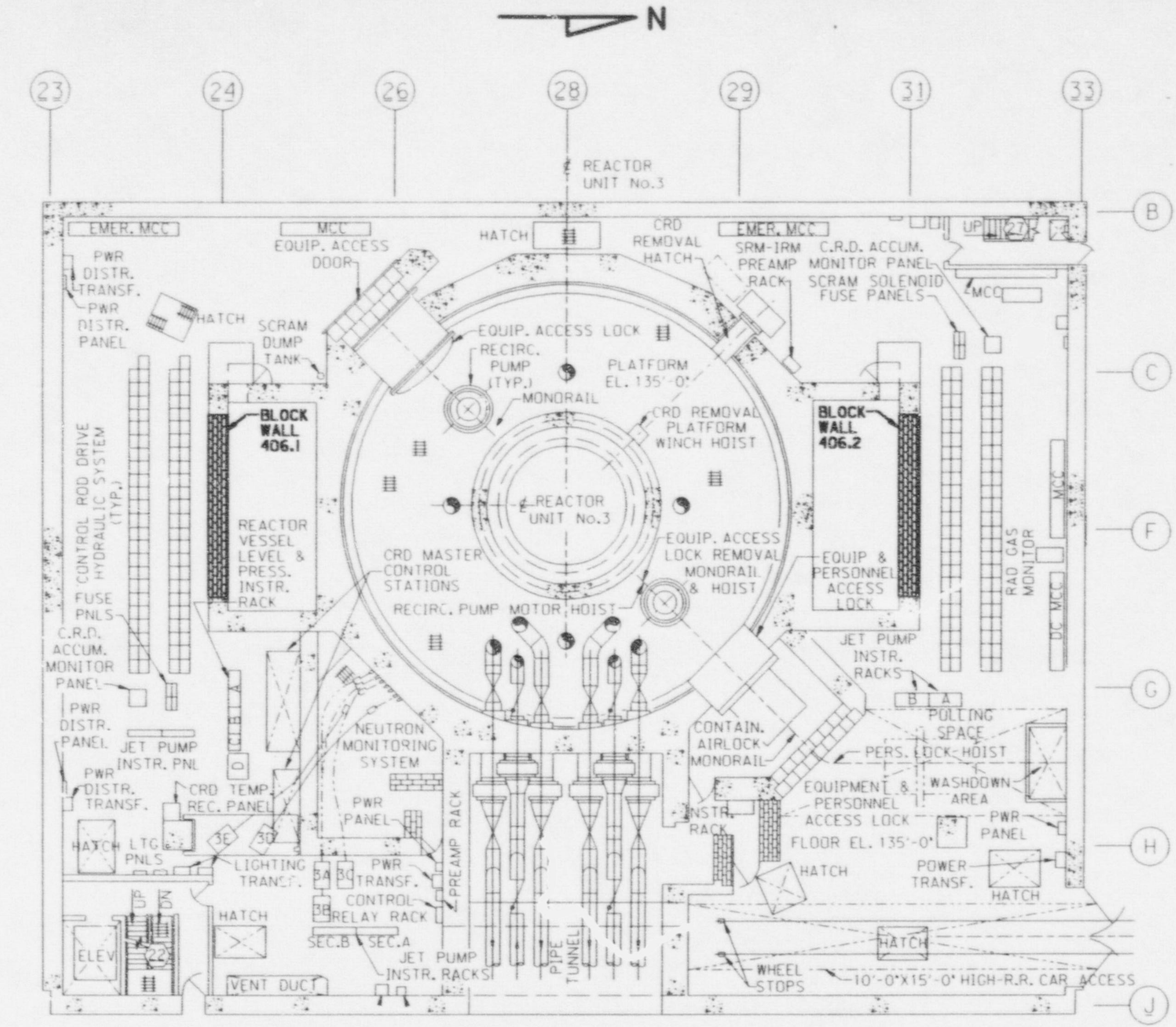

Figure S.2-2 REACTOR BLDG. UNIT #3 EL. 135'-0"

EXCERPT FROM DRAWING M-3, SH. I

Question

3. The submittal does not provide a description of unit differences, and does not identify which SPCL components (a) belong to Unit 2, (b) belong to Unit 3, and (c) are shared among Units 2 and 3. Please identify and describe in detail any differences among the plant units. Please confirm (and justify) whether or not the reported capacity and other seismic IPEEE results apply equally to Units 2 and 3.

Response

3. The Peach Bottom Units are essentially identical; however, Unit specific SPCLs were created and walkdowns were performed on both Units. The capacities and other results apply to both Units. Table S.3 provides the equipment requiring resolutions (both completed and planned) from IPEEE Tables 7.2-1a and b.

TABLE S.3

UNIT 0, COMMON	
EQUIPMENT CLASS	**EQUIPMENT NUMBER**
1	00B53 00B54 00B55 00B56 00B97 00B98 00B99
2	00B94/95/96
4	00X103 0AX26/0BX26/0CX26
5	0AP57/0BP57
8A	MO-33-0498
9	0AV035/36 0BV035/36
10	00F043 0AV034
17	0AG12/0BG12/0CG12/0DG12
20	0AG13/0BG13/0CG13/0DG13 0AC097/0BC097/0CC097/0DC097 00C29A/B/C/D
22	Pipe Stanchion Supports in RW Bldg. 165' El. 165' Mech. Equipment Room HVAC Ducting

TABLE S.3 (Continued)

UNIT 2	
EQUIPMENT CLASS	**EQUIPMENT NUMBER**
1	20B36
2	20B10/11/12/13
3	20A15/16/17/18
4	20X133/150 20X30/31/32/33
5	2AP42/2BP42/2CP42/2DP42
7	AO2-01-080A/B/C/D AO2-01-086A/B/C/D AO2-03-33
8A	MO2-10-016A/B/C/D MO2-23-019 MO2-23-025 MO2-10-025A/B MO2-13-027 MO2-13-131 MO2-30-2233A/B MO2-13-4487
8B	SV-8130B
10	PO2-0223-1 PO2-0223-3
14	20D21/22/23
15	2AD01/2BD01/2CD01/2DD01
16	20D37
18	2AC65/2BC65 DPS-20224-1 DPS-20224-3
20	20C124 20C32/33 20C722A/B 20C818 20C139
21	2AE24/2BE24/2CE24/2DE24
22	Pipe Stanchion Supports in Reactor Bldg. 195'

TABLE S.3 (Continued)

UNIT 3	
EQUIPMENT CLASS	EQUIPMENT NUMBER
1	30D11
2	30B10/11/12/13
3	30A15/16/17/18
4	30X133/150 30X31/33 30X135
5	3AP42/3BP42/3CP42/3DP42
7	AO3-01-080A/B/C/D AO3-01-086A/B/C/D AO3-03-33
8A	MO3-23-019 MO3-23-025 MO3-10-016A/B/C/D MO3-12-015 MO3-10-025A/B MO3-13-027 MO3-13-131 MO3-13-132 MO3-30-3233A/B MO3-13-5487
14	30D22/23/24
15	3AD01/3BD01/3CD01/3DD01
18	3AC65 TIC-30223
20	30C124 30C32/33 30C722B 20C819
21	3AE24/3BE24/3CE24/3DE24
22	U3 HCUs

Question

4. The submittal does not present random failure rates, operator failure rates (including seismic impacts on error rates), or screening criteria applied to random and human failure rates. NUREG-1407 requests that such screening criteria be considered. Provide a list of all operator actions that are required to ensure integrity of the chosen success paths. For each human action, indicate the time after the earthquake that the operator action is required, and its location. Indicate also the human error probabilities, accounting for seismic affects on operator actions. Provide a list of the random failures (and their failure rates) having the most significant potential to compromise integrity of the success paths. Indicate the screening criteria applied to rates of random failures and operator errors, and report the results of your screening evaluation.

Response

4. The Peach Bottom seismic analysis is a seismic margins analysis (SMA) and as such does not explicitly itemize either non-seismic failures or human actions as a seismic Probabilistic Safety Assessment (PSA) would.

Non-seismic failures were accounted for in the analysis (see IPEEE Section 3.1.2.5.4.1) by providing alternates for single train/low reliability systems (e.g., providing RCIC as an alternate to HPCI) per EPRI SMA criteria. Also, system diversity was maximized between the primary and alternate paths so that an equipment failure in one path would leave the other path available.

As noted in the IPEEE report (Section 3.1.2.5.4.2), the actions called for in the SMA are nearly identical to those in the Peach Bottom Individual Plant Examination (IPE). The IPE human reliability analysis takes into account operators and other personnel performing actions required for safe plant shutdown under the stress of plant transients ranging from a manual shutdown to an Anticipated Transient Without Scram or large break loss-of-coolant accident. The rate of operator error should not vary greatly from the IPE values due to the initiating event being a seismic event. The actions involved are proceduralized and trained actions and are performed primarily from the control room or locations in other seismically qualified buildings; and thus, access to non-control room locations is judged to be similar to loss of offsite power scenarios.

Question

5. There is no discussion in the IPEEE report pertaining to an evaluation of seismically-induced floods that specifically addresses failures of non-safety tanks and piping (other than fire-water piping). Please report the findings of your walkdown and resulting evaluation pertaining to seismically induced floods that may be caused by non-safety tank failures and non-fire-water piping failures.

Response

5. There are four large flat bottomed tanks located in the yard area near safety related structures. They are the refueling water storage tank (450,000 gal), two condensate storage tanks (200,000 gallons each) and the torus water storage tank (1,000,000 gal). None of these tanks are on the SPCL, and therefore, none were structurally evaluated for the IPEEE. These tanks are enclosed within reinforced concrete dike structures which are seismically designed for the effects of the maximum ground acceleration due to the Design Earthquake. Plant walkdowns as described in IPEEE Section 5.2.2 indicate that the plant structures provide adequate protection to safety related equipment from the effects of flooding outside the plant.

   Components on the SPCL were evaluated for potential sources which could flood or spill onto the equipment during the walkdowns. This evaluation included all piping systems in the vicinity of the equipment including non-fire water systems. Any unscreened issues associated with this evaluation are identified in IPEEE Table 3.1.4-2.

Question

6. Even for plants characterized as rock sites, there may still exist some soil-founded or buried components (e.g., piping and tanks) or soil structures (including onsite or offsite canals, dams, or embankments) that can affect plant response. Please identify any such components, evaluate their importance to plant safety, evaluate the potential and effects of soil response/failure (including soil settlements/ deformations, soil stresses, etc.) on their capacities, and report your related analyses and findings.

Response

6. The guidance provided in Supplement 5 to Generic Letter 88-20 for focused-scope plants states that soil-related failures need not be evaluated for the seismic IPEEE. Peach Bottom has been evaluated as a focused-scope plant. However, the following paragraphs summarize the IPEEE reviews that were performed for the effects of soil response/failure.

   As stated in IPEEE Section 3.1.1.3.11, a review of dams and dikes was not performed as part of the seismic evaluation because they are not relied upon to supply water for the safe shutdown of the plant following the review level earthquake (RLE). IPEEE Section 5.2, "External Floods," describes the effects of external floods on the plant resulting from potential dam failures.

   Buried piping which is part of the safe shutdown success path was evaluated for the RLE of 0.3g. The structural integrity of the buried piping was evaluated by considering associated stresses induced in a long buried pipe by the free field vibration of the surrounding soil mass, and by evaluating the seismically induced differential movements of the pipe and structure which the pipe enters or connects. The evaluation shows that the HCLPF for the buried piping is greater than 0.3 g.

Question

7. From Table 3.1.4-2 of the IPEEE submittal, for each equipment class where not all components were screened out, identify the bounding (lowest capacity or severest) case. For each identified bounding case, please provide completed screening evaluation work sheets, walkdown notes/checklists, photographs, and capacity calculations (where performed). The applicable equipment classes include:

- motor control centers
- switchgear (low and medium voltages)
- transformers
- vertical pumps
- valves (fluid-operated, motor-operated, and solenoid-operated types)
- fans
- air handlers
- distribution panels
- batteries and racks
- battery chargers and inverters
- engine generators
- instruments on racks
- control and instrumentation panels and cabinets
- tanks and heat exchangers
- electrical cable trays and conduit
- control rod drive units and hydraulic control units
- heating, ventilation, and air conditioning ducting

Response

7. The response to this question will be provided by August 1998.

Question

8. Discuss the ability of the primary and alternate success paths to respond to medium and large loss-of-coolant accidents resulting from stuck-open safety-relief valves.

Response

8. Medium and large loss-of-coolant accidents are not required to be considered in the seismic margins analysis per EPRI NP-6041-L, Section 3. However, if a safety-relief valve (SRV) would stick open, reactor depressurization would result. This possibility was implicitly considered in selecting systems to be used on the SPCL. Reactor depressurization is required for the alternate path to allow low pressure coolant injection. Thus, a stuck open SRV only moves the plant from the preferred to the alternate success path.

B. INTERNAL FIRE ANALYSIS

Question

1. In Sections 4.4.1.1 and 4.4.1.2 of the submittal (pages 4-39 to 4-41), it is stated that, for fire compartments 2S, 2X, 2Y-2, 4, 50R-6, 31 through 39, and 41, the time to damage is greater than the sum of the detection and suppression times. It is assumed that for 4 kV switchgear rooms and battery rooms, the fire brigade can respond, and the response time is 30 minutes. Thus, the time to damage can be concluded to be greater than 30 minutes. Sufficient information is not provided in the submittal to verify this conclusion. A severe fire (i.e., one that propagates relatively rapidly and damages a number of equipment and cables), is possible to occur in a 4 kV switchgear room, because of the high energy equipment in the room. Please provide further information regarding the fire scenarios considered, and the time to cable and equipment damage determined, for the compartments listed above.

Response

1. **Fixed Combustible Modeling**

IPEEE Section 4.4.1.1 of the submittal discusses fixed combustible modeling (probability of damage from fires due to fixed combustibles). Fire scenarios considered for the areas in question consisted of electrical equipment in the area, and other combustibles as identified in Chapter 5 of the Peach Bottom Fire Protection Program (FPP). Specific fire sources, associated heat release rates (HRR), and method of suppression are as follows:

Fire Compartment 2S

The fire modeled for fire area 2S involved the ignition of a lube oil spill in the area. The fire size (HRR) was calculated following the methodology outlined in IPEEE Section 4.3.2.3. Using this methodology, the HRR of the lube oil fire was calculated to be 29,025 BTU/sec. The time to cable damage in this area was calculated to be 11 seconds. Actuation of the area suppression system was calculated to be approximately 10 seconds, precluding component damage.

Fire Compartment 2X

The fire modeled for fire area 2X involved the ignition of a lube oil spill in the area. The fire size (HRR) was calculated following the methodology outlined in IPEEE Section 4.3.2.3. Using this methodology, the HRR of the lube oil fire was calculated to be 29,025 BTU/sec. The time to cable damage in this area was calculated to be 11 seconds. Actuation of the area suppression system was calculated to be approximately 10 seconds, precluding component damage.

Fire Compartment 2Y2

The fire modeled for fire area 2Y2 involved the ignition of a lube oil spill in the area. The fire size (HRR) was calculated following the methodology outlined in IPEEE Section 4.3.2.3. Using this methodology, the HRR of the lube oil fire was calculated to be 457,875 BTU/sec. The time to cable damage in this area was calculated to be 11 seconds. Actuation of the area suppression system was calculated to be approximately 7 seconds, precluding component damage.

Fire Compartment 4

The fire modeled for fire area 4 involved the ignition of a lube oil spill in the area. The fire size (HRR) was calculated following the methodology outlined in IPEEE Section 4.3.2.3. Using this methodology, the HRR of the lube oil fire was calculated to be 457,875 BTU/sec. The time to cable damage in this area was calculated to be 11 seconds. Actuation of the area suppression system was calculated to be approximately 7 seconds, precluding component damage.

Fire Compartment 50R-6

The fires modeled for fire area 50R-6 included lube oil within equipment and electrical cabinets located in the area. The fire size (HRR) for the lube oil was calculated following the methodology outlined in IPEEE Section 4.3.2.3. Using this methodology, the HRR of the lube oil fire was calculated to be 126,900 BTU/sec. The time to cable damage in this area for the lube oil fire was calculated to be 11 seconds. Actuation of the area suppression system was calculated to be approximately 9 seconds, precluding component damage. The electrical cabinet fires modeled for the area were calculated following the methodology outlined in IPEEE Section 4.3.2.3. Using this methodology, the largest cabinet HRR was calculated to be 33 BTU/sec. No damage to safe shutdown components in this area was postulated due to the low HRR of this fire.

Fire Compartment 31 and 41

For these areas, FPP Table A-1 states that the battery cases in the area do not constitute a fire hazard due to their high ignition temperature, low heat content, and being filled with an aqueous solution, however, because no other combustibles exist in the area, a battery case fire with a HRR of 100 BTU/sec was modeled for each area.

Fire Compartment 32

The fire modeled for each switchgear room is based on the maximum calculated switchgear fire. This fire was calculated following the methodology outlined in IPEEE Section 4.3.2.3 and the following.

The 4kV switchgear are comprised of several cubicles separated by metal barriers. The development scenario of a fire in one of these cubicles is based on Appendices H and I to EPRI Report Project 3385-01, "Fire Risk Analysis Implementation Guide". These appendices are based on full-scale electrical cabinet fires that were performed by Sandia Labs. Appendix I, "Heat Release Rates for Electrical Cabinet Fires", outlines the factors involved in calculating the HRR from a cabinet fire and the location of the virtual source of the fire. The 4kV switchgear contain conduit penetrations at the top of the switchgear cubicles, these penetrations are sealed at the cabinet/cable interface to prevent the propagation of fire past the seal. Ventilation for the cabinets is provided by louvers located approximately two (2) feet above the bottom (floor level) of the cabinets. In accordance with Table I-1, the virtual source of the fire should be located at the height of the ventilation louvers, and 20% (radiation portion) of the HRR subtracted. This provides a separation of approximately ten (10) feet between the fire source and the protected cables. Appendix H, "Electrical Cabinet Fires - Effect on Adjacent Cabinets", discusses damage to adjacent cabinets/cubicles in electrical enclosures. For cabinets constructed similar to the 4kV switchgear, it can be assumed for a fire in one of the switchgear cubicles that:

1. No damage will occur in adjacent cubicles for approximately 10 minutes.

2. Fire spread to an adjacent cubicle will not occur for approximately 15 minutes.

3. Fire spread external to the cabinet will not occur.

Due to these conclusions, a fire initiated within a switchgear at Peach Bottom and propagating to more than 2 to 3 cubicles beyond the cubicle of origin, or propagating external to the switchgear is not considered a credible event.

Using this methodology the HRR calculated for this fire area was 90 BTU/sec. Time to damage was calculated to be 2990 sec. Manual suppression was credited for precluding component damage in this area. Fire brigade response for the area was determined to occur in approximately 10 minutes (600 seconds); however, for analysis purposes, manual suppression was not credited for 30 minutes (1800 seconds). This 20 minute delay allows for the fire brigade to stage equipment and prepare for fire fighting activities.

Fire Compartment 33 through 39

These compartments were evaluated in a similar fashion to Compartment 32. Results for these compartments are shown below.

Compartment	Calculated HRR (BTU/sec)	Calculated Time to damage (sec)
33	88	3454
34	100	2422
35	92	2862
36	110	2002
37	116	1800
38	104	2239
39	102	2328

Transient Modeling

IPEEE Section 4.4.1.2 of the submittal discusses transient combustible modeling (probability of damage from fires due to transient combustibles). The largest expected transient combustible for theses areas was calculated to be four bags of plant trash. The HRR calculated for this fire was 226 BTU/sec. Due to revisions in the plant procedure requiring minimum separation distances of transient combustibles from electrical components in the plant, no damage due to transient combustibles was postulated.

Question

2. The submittal does not provide any information regarding failed system trains caused by a fire, and the associated alternate shutdown paths. NUREG-1407 requests such information to be provided. Please provide, for the seven unscreened fire scenarios, the failed system trains and associated alternate shutdown paths.

Response

2. Fire compartments 6N, 13N, 25, 32, 34, 50R-2/4 and 50R-9a failed to screen out, based on the methodology described in IPEEE Section 4.6.2, "Calculation of Unavailability (P_4) Resulting from Target Analysis." Conclusions for these compartments are discussed in IPEEE Sections 4.6.5, "Control Room (Fire Compartment 25)" and 4.10, "Summary of Fire Analysis."

   Compartments 6N, 13N, 32, 34, 50R-2/4 and 50R-9a were evaluated by determining the availability of additional systems from the Peach Bottom IPE capable of performing the necessary shutdown functions. The initial set of equipment evaluated was based on the Appendix R analysis set of equipment and cables. Additional candidate systems were selected based on one or more of the following criteria:

- Independence from the compartment(s) under consideration, or having minimal targets located there
- Provides a function (makeup, decay heat removal, etc.) redundant to a function which is challenged by a fire in the compartment
- Relative effort required to identify their target cables and equipment
- High PSA worth
- Uncomplicated support systems, or support systems already analyzed by Appendix R analysis
- Use is directed by Emergency Operating Procedures.

The Appendix R analysis set of systems were augmented with these additional systems, resulting in the following analysis population:

- ECCS and support systems already analyzed for Appendix R
- ECCS and support systems not currently utilized for Appendix R
    - Emergency Cooling Water System (redundant to ESW)
    - Torus hardened vent (redundant to containment cooling)
- Other BOP systems
    - Condensate and Feedwater (redundant to High & Low pressure ECCS)
    - Offsite Power supply to 4kV safeguard switchgear (redundant to Diesels)

These systems were either demonstrated to be located outside the compartment under consideration, or their equipment/cables were identified as targets in the compartment for evaluation of spheres of damage (SOD) effects. SODs were systematically evaluated (per IPEEE Sections 4.3 and 4.4) to determine their impact on the identified targets. The PSA results of these individual SOD vs. Target interactions were aggregated to determine the 'final probability' shown in IPEEE Table 4.6-2. Table F.2 is provided below which summarizes the surviving/failing systems identified on a "per compartment" basis. The final probability shown is representative of the most impacted Peach Bottom Unit.

'Final probability' results for compartment 25 shown on IPEEE Table 4.6-2 are based on NUREG/CR-4550, Volume 4, Part 3, "Analysis of Core Damage Frequency: Peach Bottom, Unit 2, External Events." For information purposes, the systems provided with alternative shutdown capability for a fire in this compartment are shown in Table F.2.

Table F.2

SAFE SHUTDOWN SYSTEMS vs. FIRE COMPARTMENT MATRIX

Fire Compartment / *Final Probability*		Safe Shutdown Functions / Trains																																							
		Inventory Control											Press.	Decay Heat Removal									Support Systems							Electrical Power										Instrum.	
		High Press.		Core Spray				LPCI				BOP	Cntl.	Supp. Pool Cooling				Alt. SD Cooling				Torus	Emerg. Svc. Wtr.			Hi Press. Svc. Wtr.				Diesel Generators				Offsite Pwr.		Safegd. Batteries					
	Unit	RCIC	HPCI	A	B	C	D	A	B	C	D	FW/Cnd	RVs	A	B	C	D	A	B	C	D	Vent	A	B	ECW	A	B	C	D	A	B	C	D	2SU	3SU	A	B	C	D	RVI	SPI
6N	2	F	F	S	F	S	F	S	F	S	F	N/A	S	S	F	S	S	S	F	S	F	F	S	S	N/A	S	S	S	S	S	S	S	S	F	S	S	S	S	S	S	S
3.20E-06	3	S	S	S	S	S	S	S	S	S	S	N/A	S	S	S	S	S	S	S	S	S	S				S	S	S	S							S	S	S	S	S	S
13N	2	S	S	S	S	S	S	S	S	S	S	N/A	S	S	S	S	S	S	S	S	S	S	S	S	N/A	S	S	S	S	S	F	S	F	S	S	S	S	S	S	S	S
2.70E-06	3	S	F	S	F	S	F	S	F	S	F	N/A	S	F	F	S	F	S	F	S	F	S				S	F	S	F							S	S	S	S	S	S
25 (Note 2, 3)	2	F	S	F	F	F	F	F	S	F	F	F	S	F	S	F	F	F	S	F	F	F	S	F	N/A	F	S	F	S	F	S	F	S	F	F	S	S	S	S	S	S
6.20E-06	3	F	S	F	F	F	F	F	F	F	S	F	S	F	F	F	S	F	F	F	S	F				F	S	F	S							S	S	S	S	S	S
32	2	F	S	S	S	F	S	S	S	F	S	S	S	F	S	F	S	S	S	F	S	S	S	F	S	S	S	F	S	S	S	F	S	S (1)	S (1)	S	S	S	S	S	S
2.20E-06	3	F	S	S	S	F	S	S	S	F	S	S	S	F	S	F	S	S	S	F	S	S				S	S	F	S							F	S	F	S	S	S
34	2	S	S	S	F	S	F	S	F	S	F	S	S	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S (1)	S (1)	S	S	S	S	S	S
2.50E-06	3	S	F	S	F	S	F	S	F	S	F	S	S	S	F	S	F	S	F	S	F	S				S	F	S	F							S	S	S	F	S	S
50R-2/4	2	S	S	S	S	F	F	S	F	F	F	N/A	S	S	F	F	F	S	F	F	F	S	S	S	N/A	S	S	S	S	F	F	F	F	S	F	S	S	S	S	S	S
3.70E-06	3	S	S	F	F	F	F	F	F	S	F	N/A	S	F	F	S	F	F	F	S	F	S				S	S	S	S							S	S	S	S	S	S
50R-9a	2	S	S	F	F	F	F	S	F	F	F	N/A	S	S	F	F	F	S	F	F	F	S	F	S	N/A	S	F	F	F	S	F	S	F	S	F	S	S	S	S	S	S
1.40E-06	3	S	S	F	F	F	F	F	F	S	F	N/A	S	F	F	S	F	F	F	S	F	S				F	F	S	F							S	S	S	S	S	S

Key: F = Failure

S = Success

N/A = Availability Not Analyzed for this Compartment (not credited)

Note 1: Offsite power supply only available for FW/Condensate (not for 4kv safeguard busses).

Note 2: Surviving systems represent Alternative Shutdown method provided for this compartment.

Note 3: Final Probability is from NUREG/CR-4550.

Question

3. The submittal includes a discussion on core damage frequency and how it is not used in the IPEEE. However, since the Probabilistic Safety Assessment (PSA) model is used to quantify the fire induced safe shutdown system unavailability, it is inferred that actually core damage frequency is used to screen compartments and obtain the final seven unscreened compartments. Use of the PSA model implies that the analysis considered potential initiating events caused by a fire, failure of equipment needed to mitigate the effects of the initiating event, and unavailability of equipment that remained unaffected by the fire. Without such considerations (i.e., an initiating event occurrence and chain of failures leading to core damage), a measure based on "safe-shutdown system unavailability is difficult to interpret consistently for all fire compartments, and any comparison with a standard screening criteria may be inappropriate. Please provide an interpretation of the measure that you used for screening the fire compartments.

Response

3. The use of FIVE for assessing and screening fire areas is intended to focus the analysis to those areas that have the potential to impact risk due to fires. As noted in IPEEE Section 4.6.4 the calculations performed can serve as a surrogate for core damage frequency (CDF) when comparing to the screening criteria. The submittal was attempting to characterize the calculation of equipment unavailability as conservative and not directly comparable with the CDF calculated in the IPE. Many systems credited in the calculation of CDF in the IPE were not considered in the fire risk analysis. In addition, recovery of systems (such as offsite power and diesel recovery from random failures) not impacted by a fire were not credited. Maintenance activities such as repair of fire impacted equipment/cables is also not credited. These elements lead to a conservative estimation of risk.

Question

4. The discussions provided in the submittal on seismic fire interaction do not address the possibility of the following scenario. A near-SSE seismic event may cause the non-safety electrical cabinets in the cable spreading room to either tip over or slide and initiate a fire. These cabinets are located underneath a group of safety-related cables. Thus, there is a potential for safe-shutdown cable damage from such a fire. The cable spreading room is protected by a CO_2 system. However, the system has two potential weaknesses that may prevent CO_2 from reaching the cable spreading room. Lack of proper anchors for the CO_2 storage tank may cause the tank to move and shear the supply pipe that is anchored to the ceiling, or a relay chatter may prevent the supply valve from opening. As a result of the cable spreading room fire, the operators have to abandon the control room and shut both units down from their respective remote shutdown panels. The human error probabilities for using the remote shutdown panel used in other parts of the fire analysis may not apply to

this case, due to the special conditions created by the earthquake. Please provide a discussion on how this scenario was considered, the associated conditional core damage probability, and if appropriate, what mitigative measures are in place to minimize the consequences of this scenario.

<u>Response</u>

4. The submittal did not address the scenario described in question 4. A qualitative evaluation of the proposed scenario reveals a very low probability of occurrence compared to the fire/seismic interactions considered in the submittal. This conclusion of the probability is based on the following considerations:

The likelihood of a near-SSE seismic event

The likelihood of an electrical cabinet sliding or tipping

The likelihood of a fire initiation is low for this area due to the fact that power cable is not routed via the cable spreading room. Only low voltage (120 VAC & 125 VDC) and instrument power is routed there. In addition, external panel wiring is qualified to IEEE-383 or equivalent (per FPP), internal panel wiring is flame retardant per the national electric code (type SIS), and all circuits are protected by fault-actuated protective devices (per FPP) (i.e., fuses & breakers).

The likelihood of fire growth and spread is low due to the flame-retardant cabling in the cable spreading room, the cabinets are substantially constructed, cables are harnessed together inside the cabinets (minimizing the surface area of exposed cable jacketing that would fuel a fire), and the fire must spread into the overhead cable trays and affect safety related/safe shutdown circuits (this is unlikely based on IEEE-383 cable and the fact that the fire must first spread out of the cabinet with enough intensity to ignite the IEEE-383 cable).

Even during a seismic event, the probability of early detection is high because trouble alarms associated with detection system failure require investigation by operations (trouble/failure indication required by NFPA Code) and plant personnel would be in the cable spreading room after a seismic event due to the normal recovery process. These processes would identify slowly developing fires.

The probability of failure of all automatic suppression systems and manual suppression attempts using the Cardox System, hand-held extinguishers, water hose lines, CO_2 hose lines, and offsite fire department assistance is very low.

Conditional upon all of the above failures, shut down from either the Remote Shutdown Panel, or the Alternative Shutdown Panels can be performed.

C. HIGH WINDS, FLOODS, AND OTHERS ANALYSIS

Question

1. Please provide an evaluation demonstrating whether or not loss of the contents of the Conowingo Pond, due to dam failure, can be screened out as a possible plant-unique hazard.

Response

1. The loss of Conowingo Pond is a design basis accident for Peach Bottom that is discussed in Updated Final Safety Analysis Report Section 10.24, "Emergency Heat Sink." Thus, loss of Conowingo Pond is screened under Criterion 2, in IPEEE Section 5.0.1.