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SHIELDS L. DALTROFF
VICE PRESIDENT
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April 15, 1983

Docket Nos. 50-277
50-278

Mr. Darrell G. Eisenhut, Director
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

SUBJECT: Response to NUREG-0737, Supplement 1, Requirements for Emergency Response Capabilities for Peach Bottom Atomic Power Station

Dear Mr. Eisenhut:

This letter provides the information requested by April 15, 1983, in Generic Letter No. 82-33 regarding NUREG-0737, Supplement 1. Attachments I through V address each of the five basic requirements in the NRC document. The status and plans for implementation of these requirements for Peach Bottom are summarized below:

I. Safety Parameter Display System (SPDS)

The attachment proposes a modification to one area of the existing control panels in order to establish an SPDS in the Peach Bottom control room. Additionally, the attachment provides justification for excluding the reactivity control information from the SPDS. A written safety analysis describing the basis for parameter selection will be submitted by October 1, 1983.

A046

II. Detailed Control Room Design Review (CRDR)

The program plan for this task is described in the attachment. The design review has been completed as required by Section 5 of Supplement 1 to NUREG-0737, and in accordance with the BWR Owners's Group CRDR program. Recommendations for control room improvements identified by the review program will be assessed as described in the program plan, and a summary report proposing improvements and an implementation schedule will be submitted to the NRC by May 1, 1984.

III. Regulatory Guide 1.97 - Accident Monitoring Instrumentation

The design of the instrumentation systems at Peach Bottom currently meets a majority of the requirements in R.G. 1.97. A study comparing existing design with R.G. 1.97 requirements has been in progress for more than a year. Modifications have already been initiated for some instrumentation systems to bring their design into conformance with the guidance. The length of the study has been impacted by the time consuming task of locating equipment qualification test data from the manufacturers. For this reason, the extent to which Peach Bottom complies with R.G. 1.97 will not be completed until mid 1984; however, the bulk of the information requested will be provided by January 1, 1984. The submittals will identify proposed modifications, implementation schedules, and justifications for exceptions to the guidance.

IV. Upgrade Emergency Operating Procedures

In response to the requirements of NUREG-0737, Item I.C.1, new symptom oriented emergency operating procedures have been implemented for Peach Bottom. The procedures are based on the BWR Owners' Group Emergency Procedure Guidelines recently approved by the NRC. The elements of the procedures generation package are described in the attachment; i.e., preparation of plant specific procedures, validation and verification, and training program.

V. Emergency Response Facilities

The emergency response facilities were completed in time for their demonstration during the June 16, 1982 emergency plan exercise. Exceptions to the requirements of NUREG-0737, Supplement 1, have been requested in previous submittals to the NRC and are repeated in the attachment. The exceptions involve the following requirements:

1. Thirty minute augmentation of the staff during emergencies.

2. Backup Emergency Operations Facility.

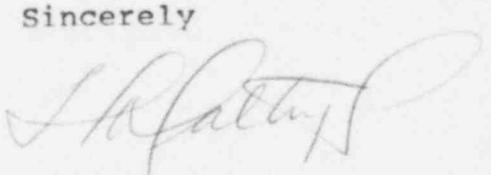
3. Location of Technical Support Center within site protected area.

Justification and compensatory measures taken are described in the attachment for these exceptions.

A description of the meteorological monitoring system and the informatin promised in our letter of January 14, 1983 (S. L., Daltroff, PECo. to D. G. Eisenhut) is provided in attachment VI. The description supersedes the one provided in correspondence dated May 6, 1982 (S. L. Daltroff, PECo. to D. G. Eisenhut). The primary design change involves the removal of the class A dose assessment model from the on-site computer because the corporate computer site terminal is readily accessible to on-site personnel in the Emergency Operations Facility.

Should you have any questions regarding the proposals and information discussed in these attachments, please do not hesitate to contact us.

Sincerely



cc: A. R. Blough, Site Inspector
Peach Bottom

Attachments

COMMONWEALTH OF PENNSYLVANIA :

: ss.

COUNTY OF PHILADELPHIA :

S. L. Daltroff, being first duly sworn, deposes and says:

That he is Vice President of Philadelphia Electric Company, that he has read the foregoing letter dated April 15, 1983 relating to the Company's response to NUREG-0737, Supplement 1, Requirements for Emergency Response Capability; and that he 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.

S. L. Daltroff

Subscribed and sworn to
before me this 15TH day
of APRIL, 1983.

Judith J. Franklin

Notary Public

Notary Public, Philadelphia, Philadelphia Co.
My Commission Expires July 28, 1983

Docket Nos. 50-277
50-278

ATTACHMENT I

Safety Parameter Display System (SPDS)
(Response to the Criteria in Section 4 of NUREG-0737, Supplement 1)

NRC Requirements:

Each operating reactor shall be provided with a SPDS that is located convenient to the control room operators. This system will continuously display information from which the plant safety status can be readily and reliably assessed by control room personnel who are responsible for the avoidance of degraded and damaged core events. The April 15, 1983, utility response should:

a. Provide the current status of the SPDS design;

b. Provide the date for submittal of a safety analysis which describes the basis for parameter selection and a SPDS implementation plan;

c. Provide the date when the SPDS will be operable and the operators will be trained;

d. Indicate if the utility desires a pre-implementation review by the NRC and provide dates for the desired start of the NRC review, the scheduled completion date of the verification and validation program, and the desired completion of the NRC review; and,

e. Propose an integrated schedule for implementation in which the SPDS design is an input to other initiatives (i.e., the control room design review, the emergency operating procedures, and operator training).

PECo. Response

1. Current Status of SPDS Design

The existing instrumentation in one area of the Peach Bottom control room, plus the addition of one parameter, will be selected to serve as the Safety Parameter Display System. Following the addition of a recorder for reactor pressure,

the implementation of the SPDS at Peach Bottom APS Units 2 and 3 will be complete. The SPDS has been integrated into the control room design, the development of symptom-oriented emergency operating procedures, and operator training. The final SPDS will provide a concise display of critical plant variables to the control room personnel who are responsible for the avoidance of degraded and damaged core events to aid them in rapidly and reliably determining the safety status of the plant. The system is available during both normal and abnormal conditions.

The SPDS uses indicators, recorders, and indicating lights arranged in one section of the control room in the vicinity of the controls used by the operator during abnormal and emergency conditions to avoid a degraded core. The majority of these displays have been added as a result of other requirements contained in NUREG-0737. Their location was chosen based on human factors engineering principles and on our understanding of the intent of the SPDS concept that existed at the time the location was chosen. Utilization of this instrumentation in lieu of an independent display enhances the integration of the SPDS concept into the control room design. Additionally, major portions of the instrumentation are safety-grade and are backed up by redundant channels.

The system includes displays for reactor core cooling and heat removal from the primary system, reactor coolant system integrity, radioactivity control, and containment conditions. The variables monitored for each of these functions are shown in Table 1. The arrangement of the SPDS and its relationship to the emergency core cooling systems, primary containment isolation systems (PCIS), containment atmospheric dilution (CAD) system, and reactor core isolation cooling (RCIC) system is shown in Figure 1.

As a result of integrating the SPDS into the control room, we have concluded that displays for reactivity control should not be part of the Peach Bottom SPDS. This conclusion was based on the human factors consideration of having indicators close to the associated devices used for control. In the Peach Bottom control room, neutron flux indication, control rod position indication, control rod manual controls, scram pushbuttons, and standby liquid control system controls are all located on one side of the control room while the SPDS and the controls for the emergency core cooling systems and primary containment isolation system are located on the other

side of the room. We believe that it is much more effective to have the reactivity control indicators close to their associated controls instead of grouped with the SPDS.

As mentioned above, one additional parameter (reactor pressure) is being added to the current SPDS. The engineering required to add this indication is currently in progress. We anticipate that procurement of the necessary equipment will be initiated shortly. Our goal is to have installation complete by the end of the next refueling outage for each unit (Unit 2: Fall 1983, Unit 3: Fall 1984). The schedule for the modification on Unit 2 may be impacted by delays in equipment delivery.

2. Schedule for Submittal of Safety Analysis

A formal safety analysis describing the basis on which the selected parameters are sufficient to assess the safety status of each identified function will be submitted by October 1, 1983.

3. Schedule for Submittal of Implementation Plan

Except for reactor pressure indication, the Peach Bottom SPDS is currently operational. The engineering necessary to add indication for reactor pressure is currently in progress. If any additional enhancements are necessary as a result of the safety analysis, a revised implementation plan will be developed and submitted by October 1, 1983.

4. Schedule for Implementation of SPDS and Operator Training

Except for the indication of one paremeter, the SPDS is currently in operation. The use of the SPDS has been integrated into the operator training for the new symptom-oriented emergency operating procedures. As previously stated, the current SPDS is being modified to add indication for reactor pressure. This change and any additional enhancements found to be necessary as a result of the safety analysis will be completed by the end of the second refueling outage for unit 2 and by the end of the next refueling outage for unit 3. Upon implementation, these changes will be

incorporated into the operator training program for plant modifications.

5. Pre-implementation Review

A pre-implementation review is not requested.

6. Schedule for Integrating SPDS with Other Initiatives

Since the SPDS is operational, its design has been and will continue to be an input to the control room design review, the development of revisions to the symptom-oriented emergency operating procedures, and operator training. Verification that the additional pressure indication, and any other improvements found as a result of the safety analysis, can be introduced into the control room without creating any unacceptable human engineering descrepancies will be completed by January 1, 1984.

TABLE 1

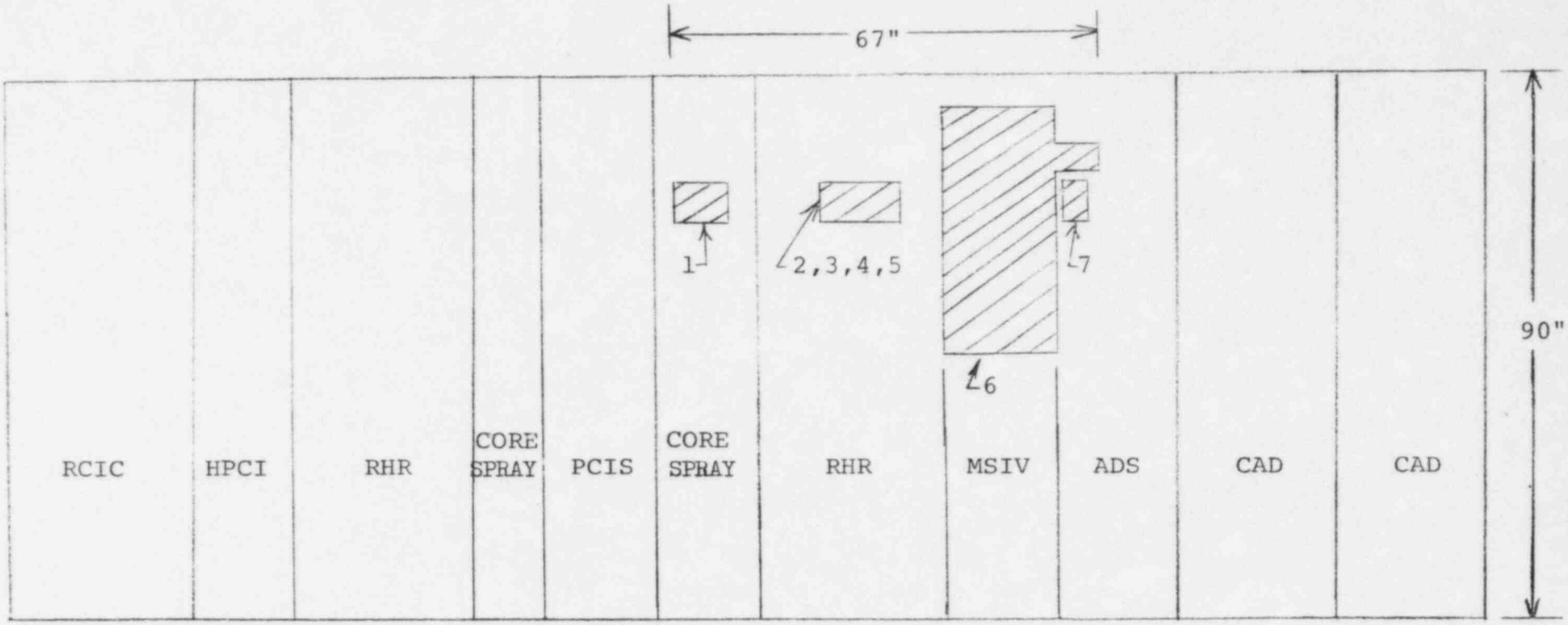
SPDS PARAMETERS

Variable \ Function	Reactor Core Cooling and Heat Removal	Reactor Coolant System Integrity	Radioactivity Control	Containment Conditions
Reactor Water Level	X			
Reactor Pressure		X		
Drywell Pressure		X	X	X
Drywell Temperature				X
Suppression Pool Temperature				X
Suppression Pool Level				X
Containment Isolation Valve Position (1)				
- Reactor Lines		X	X	
- Other Lines			X	

(1) Power operated valves except those on systems whose continued operation is essential to the mitigation of a accident.

FIGURE 1

SPDS ARRANGEMENT



Approximate Scale 1" =25"

SPDS Indicators

1. Drywell Temperature Recorder (0 to 240° F).
2. Suppression Pool Level Recorder (1 to 21 feet).
3. Suppression Pool Temperature Recorder (30 to 230° F).
4. Drywell Pressure Recorder (5 to 25 psia and 0 to 225 psig).
5. Reactor Water Level Recorder (-165 to +50 inches and -325 to 0 inches).
6. Containment Isolation Valve Position Lights (Open/Close).
7. Reactor Pressure (0 to 1500 psig).

Docket Nos. 50-277
50-278

ATTACHMENT II

Detailed Control Room Design Review (CRDR)
(Response to the criteria in Section 5 of NUREG 0737, Supplement I)

NRC Requirements:

Each utility shall conduct a CRDR for its nuclear generating stations. The objective of the CRDR is to "improve the ability of nuclear power plant control room operators to prevent accidents or cope with accidents if they occur by improving the information provided to them." A summary of the requirements for the CRDR are as follows:

5.1.a) Decisions to modify the control room shall be carefully reviewed by personnel competent in human factors engineering (HFE).

5.1.b) A CRDR shall be conducted to identify human engineering discrepancies (HED's).

5.1.c) HED's shall be assessed to determine which are significant and should be corrected.

5.1.d) Proposed improvements shall be verified to assure that they provide the necessary correction without creating unacceptable HED's for other items. Improvements shall be coordinated with other ongoing design change efforts (e.g. SPDS, Reg. Guide 1.97).

5.2.a) A program plan shall be submitted within two months of the start of the CRDR. The program plan shall describe how items 5.1 above will be accomlished.

5.2.b) A summary report of the completed review shall be submitted. The report shall outline proposed control room changes including their proposed schedules for implementation.

The April 15, 1983 utility responses should:

a) Provide the current status of the CRDR.
b) Provide the dates for completing each of the basic requirements

PECo. Response:

1. Current Status of the CRDR

The first application of human factors engineering principles to the design of the Peach Bottom APS Unit 2 and 3 control room dates back to the original design effort which included the fabrication of full scale control panel mock-ups and design review via operational walkthroughs. We believe that this process resulted in a sensibly designed control room that supports unit operations well.

The CRDR effort directed by Supplement 1 to NUREG-0737 began in 1980 with our participation in the General Electric Boiling Water Reactor Owners Group (BWROG) CRDR Subcommittee. The subcommittee produced a BWROG Generic CRDR Program to address item 5.1.b. A Peach Bottom Unit 2 and 3 control room review was conducted in accordance with the BWROG generic program as it existed in October 1981 and a report was issued in February 1982.

The generic program also called for walkthroughs of the future Symptomatic Emergency Operating Procedures (NUREG-0737, Supplement 1, Section 7) when they became available. The walkthroughs were performed as an integral part of the development and validation of the procedures and have been completed. The plan for completing the balance of the Section 5 requirements is attached. This program was developed by PECo and reviewed for validity and completeness by a consultant human factors engineer.

2. Basic Requirement Completion Dates:

5.1.a) A consultant human factors engineer (HFE) has been retained to participate in our CRDR program. HFE input was provided during the program planning phase. The consultant will review proposed modifications as a member

of the Assessment and Verification Task Force. Assessment and verification will be completed by January 1, 1984.

5.1.b) The BWROG generic CRDR was completed in October 1981. The emergency operating procedure walkthroughs have been completed. It now appears that the generic program will be supplemented in order to obtain NRC approval. Our intention is to complete the supplemental review, if required, by October 1, 1983; however, it should be recognized that meeting this date is dependent on the timely acceptance of the generic program by the NRC and issuance of the supplement by the BWROG. Considering a possible delay in NRC acceptance of the generic CRDR, we propose completion of the supplemental reviews, if required, within 6 months of NRC acceptance.

5.1.c) Assessment of the HED's will be completed by January 1, 1984.

5.1.d) Verification of the HED corrections will be completed by January 1, 1984.

5.2.a) The program plan is submitted as an attachment to this section.

5.2.b) The summary report will be submitted by May 1, 1984.

Peach Bottom APS, Units 2 & 3
Control Room Design Review Program Plan

A Control Room Design Review (CRDR) is required by Section 5 of Supplement 1 to NUREG-0737. The General Electric Boiling Water Reactor Owners' Group (BWROG) developed a generic program to partially address the NRC requirements. This generic program forms the core of the PECo CRDR effort. Details of the generic program are contained in various documents previously submitted to the NRC by the BWROG and are not repeated here.

A generic control room survey was conducted at Peach Bottom APS in October 1981 and a report documenting the survey findings was issued in February 1982. The generic program also called for walkthroughs of future emergency operating procedures required by section 7 of Supplement 1 to NUREG-0737. These walkthroughs were performed during the development and validation of the procedures. A description of the walkthrough effort is contained in Attachment IV of our April 15, 1983 response to the NRC on NUREG-0737, Supplement 1. Our plan for completing the balance of the CRDR requirements is as follows:

a. Perform BWROG generic program supplemental review (if required for program plan acceptance by the NRC).

b. Assess identified Human Engineering Discrepancies (HED's) and generate proposals to rectify those judged serious enough to warrant correction.

c. Verify that proposed modifications properly correct the HED's and are effectively integrated into the control room design.

d. Prepare a report summarizing the program actions and recommendations.

The BWROG Control Room Survey was performed by a review team consisting of PECo. other utility, General Electric, and Human Factors Engineering (HFE) personnel. The emergency operating procedure walkthroughs were performed by a Peach Bottom senior licensed operator, shift technical advisor, and shift supervisor. Items a thru d listed above will be performed by a task force composed of PECo. Engineering and Operating personnel and a

consultant HFE. The qualifications of the review team personnel will be provided as part of the summary report.

The overall CRDR program is shown in block diagram form on Exhibit 1. The following paragraphs describe the program components in greater detail:

a. Supplemental Review:

Supplemental checklist sheets are expected to be issued by the BWROG to augment the initial control room survey portion of the generic program. The methodology and contents of these sheets has been submitted by the owners' group and is not repeated here. Each control room panel will be evaluated against the checklists as appropriate.

b. HED Assessment:

Each HED identified in the preceeding efforts will be assessed for seriousness by completing an assessment questionnaire. The questionnaire was developed to address the requirements of Supplement 1 to NUREG-0737 and the agreements reached in various meetings between the BWROG and the NRC. The assessing process includes the generation of HED corrections where deemed necessary. Information on other pending modifications (e.g. SPDS, Reg. Guide 1.97, etc.) will be considered in the assessing process. Those HED's judged not to warrant correction will be analyzed for safety significance. A sample instruction sheet and questionnaire are attached as Exhibits 2 and 3.

C. Verification of HED Corrections:

Each Recommended HED correction will be verified by completing a verification questionnaire. The questionnaire is designed to assure that the modification corrects the discrepancy without creating any unacceptable side effects. Other pending modifications will be integrated with the CRDR at this stage. Proposed modifications which are disapproved will be returned to the assessment phase. A sample instruction sheet and verification questionnaire are attached as Exhibits 4 and 5. These questionnaires as

well as the questionnaire referrenced in section b above, may be refined as needed during the review process. Control room modifications proposed to address changes required by other emergency response capability requirements will be evaluated using the same verification questionnaire.

d. Reports:

Results of all steps of the CRDR Program will be documented and a summary report will be prepared. The summary report will detail the recommendations from the assessment and verification phases and contain a schedule for implementing HED improvements.

EXHIBIT 1

CRDR PROGRAM PLAN

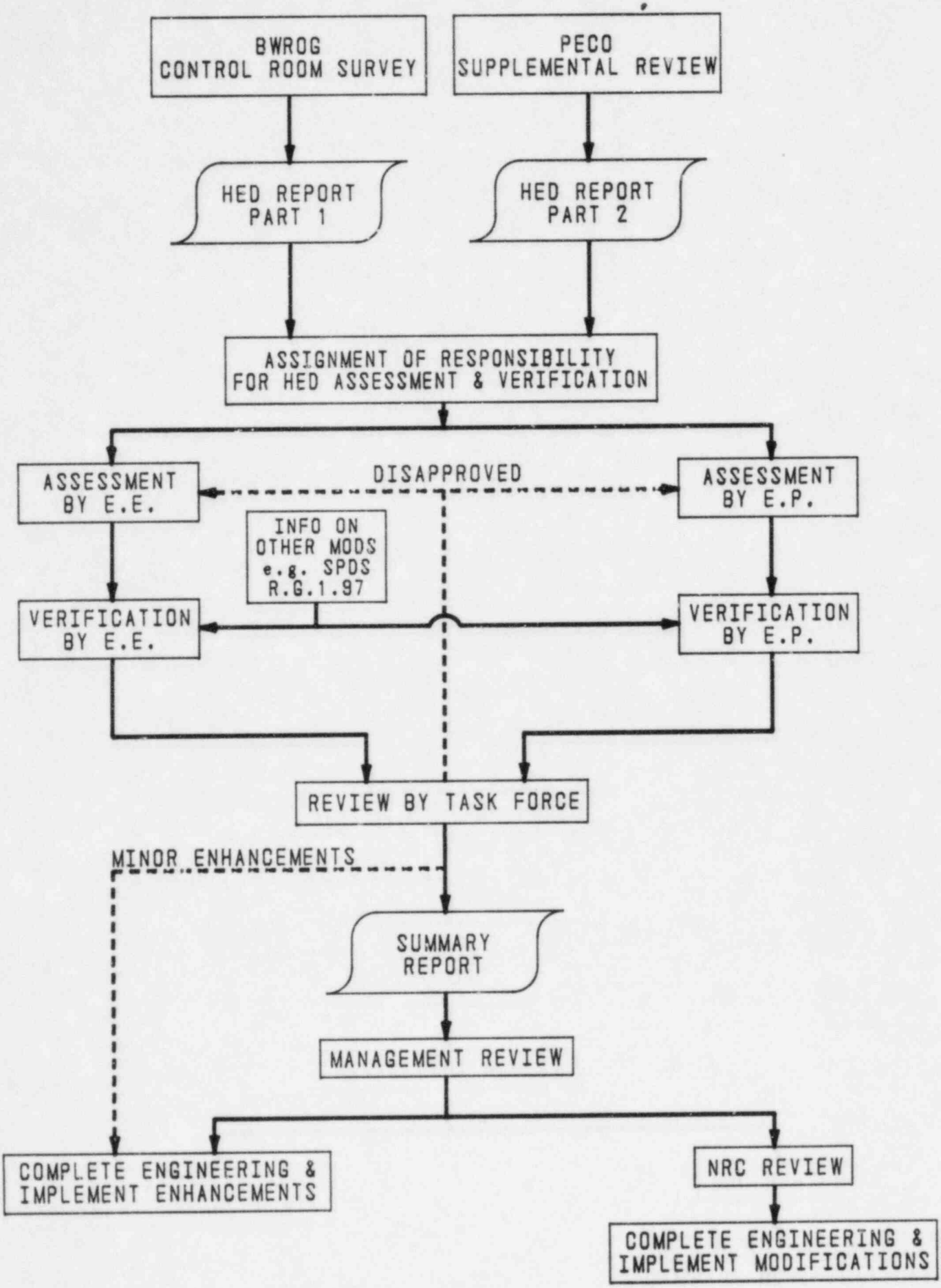


Exhibit 2

PBAPS Units #2 and #3
Control Room Design Review
HED Assessment Instructions

A. Initial assessment to be performed by Electrical Engineering or Electric Production personnel.

B. Complete an assessment sheet for each Human Engineering Discrepancy (HED) identified in the Control Room Survey. Consider both units.

C. Attach a Supplementary Sheet when additional space is needed.

D. An analysis of safety implications is not required for HED's to be corrected.

E. Consider the following when answering the reference question.

1.) Preliminary assessment by CRDS team addresses degree of compliance with CRDS checklist and potential for error. Interpret as follows:

9-12	Modification recommended
8	Modification should be strongly considered
6	Modification should be considered
4	Modification may be beneficial.

4.) Consider partial correction when total correction cannot be accomplished. Consider control board changes, improved procedures, improved Training, and other techniques.

7.) Consider individual and aggregate safety implications.

9.) Priority assignments

A - Immediate correction (generally an enhancement)
B - Future correction (generally a design alternative)
N - No correction.

10.) Provide justification for leaving any HED with safety significance uncorrected.

F. Use the following abbreviations for the summary section:

Type of Correction - E - Enhancement; DA - Design Alternative; P - Procedures; T - Training

Extent of Correction - T - Total; P - Partial

Safety Implication - Y - Yes; N - No; U - Unevaluated

G. Initial assessments to be reviewed by Task Force composed of Electrical Engineering, Electric Production, and Human Factors Engineering personnel. Sign the bottom of the sheet and note the disposition as Agree, Disagree, or Discuss.

Exhibit 3

PBAPS Units #2 and #3
Control Room Design Review
HED Assessment

HED # _____
Assessment Priority _____
Type of Correction _____
Extent of Correction _____
Safety Implications _____

1.) Description and Preliminary Assessment _____

_____

2.) What is frequency of use? _____

_____

3.) Is the HED offset by other control room characteristics or operating practices?

_____

_____

4.) How can the HED be corrected or mitigated? _____

_____

5.) Would corrections necessitate operator retraining? Impact of retraining?

_____

_____

6.) Preliminary recommended solution _____

_____

IF CORRECTION RECOMMENDED, SKIP TO STEP 8.

7.) What are the safety implications? _____

_____

8.) Final recommended solution _____

_____

9.) Priority _____

10.) Comments _____

_____

Prepared by: _____ Date: _____

Reviewed by: _____(EE) Date: _____ Disposition: _____

_____(EP) Date: _____ Disposition: _____

_____(HFE)Date: _____ Disposition: _____

Exhibit 4

PBAPS Units #2 and #3
Control Room Design Review
HED Solution Verification Instructions

A. Initial verification to be performed by Electrical Engineering or Electric Production personnel.

B. Complete a verification sheet for each Human Engineering Discrepancy (HED) solution recommended from the CRDR assessment phase. Complete a verification sheet for each modification proposed by other improvement programs. Question 1 should be omitted for these other improvements. Use the principles in the BWROG program for guidance in answering question 2.

C. Consider other proposed improvements (e.g. SPDS, Regulatory Guide 1.97 items, operating procedures) when evaluating question 2.

D. Attach a Supplementary Sheet when additional space is needed.

E. Schedule approved solutions for implementation and assign departmental responsibility in the summary section. Enhancements should be scheduled for immediate correction when feasible.

F. Use the following abbreviations for the summary section:

Type of correction - E - Enhancement
DA - Design Alternative

Extent of correction - T - Total
P - Partial

Approved/Disapproved - Resp. - A - Approved
D - Disapproved
EE - Electrical Engineering
EP - Electrical Production

Implementation Schedule - I - Immediate
ROXX - Refueling Outage, Year.

G. Initial verification to be reviewed by a Task Force composed of Electrical Engineering, Electric Production, and Human Factors Engineering personnel. Sign the bottom of the sheet and note the disposition as Agree, Disagree, or Discuss.

Exhibit 5

PBAPS Units #2 and #3
Control Room Design Review
HED Solution Verification

HED # _____
Type of Solution _____
Extent of Solution _____
Approved/Disapproved-Resp. _____
Implementation Schedule - Unit #2 _____
Unit #3 _____

1. Does the improvement bring the HED into conformance with the affected CRDS checklist item? To what extent?

_____

_____

2.) Does the improvement create an HED for other items?

_____

_____

3.) Does the improvement create an unreviewed safety question?

_____

_____

4.) Does the improvement increase the risk of failure or misoperation?

_____

_____

_____

5.) Does the improvement cause a temporary reduction in safety?

_____

_____

6.) Improvement Approved/Disapproved? _____

7.) Comments _____

_____

Prepared by:_____ Date:_____ Disposition:_____

Reviewed by:_____(EE) Date:_____ Disposition:_____

_____(EP) Date:_____ Disposition:_____

_____(HFE)Date:_____ Disposition:_____

Docket Nos. 50-277
50-278

ATTACHMENT III

Regulatory Guide 1.97 - Application to Emergency Response Facilities

(Response to the criteria in Section 6 of NUREG-0737, Supplement 1)

NRC Requirements:

Section 6.1b - Control Room

The licensee is required to provide measurements and indication of Type A, B, C, D and E variables listed in Regulatory Guide 1.97 (Rev. 2) in the control room.

The licensee is required to provide reliable indication in the control room of the meteorological variables (wind direction, wind speed, and atmospheric stability) specified in Regulatory Guide 1.97 (Rev. 2) for site meteorology.

Section 6.1c - Technical Support Center (TSC)

The Type A, B, C, D and E variables that are essential for performance of TSC functions shall be available in the TSC.

Section 6.1.d - Emergency Operations Facility (EOF)

Those primary indicators needed to monitor containment conditions and releases of radioactivity from the plant shall be available in the EOF.

Section 6.2 - Documentation and NRC Review

The licensee shall submit a report describing how it meets the above requirements.

The April 15, 1983 utility response should provide a schedule for implementing the requirements of regulatory guide 1.97 (Rev. 2).

PECo.'s Response

A review is currently being conducted to determine the extent to which Peach Bottom APS Units 2 and 3 is in compliance with the requirements of Regulatory Guide 1.97, Revision 2. This review involves identifying the particular plant instrumentation that is used to monitor each of the Type A, B, C, D and E variables listed in the Regulatory Guide and comparing this instrumentation against the requirements for the stated category for that particular variable. At this time, the design review is approximately 60% comlete with all applicable Peach Bottom instrumentation having been identified. Most of the variables have had at least a first-cut review.

The major obstacle in completing the review is the determination of whether the installed equipment meets the qualification criteria stated in R.G.1.97. Since a large majority of the equipment monitoring the various R.G.1.97 variables is original station equipment with little or no qualification test information available, the manufacturers of the selected equipment must be solicited for this information. This information is not readily available, with some manufacturers not being able to respond for several months.

The scheduled completion date for the R.G.1.97 review is December 1983, for all variables with the exception of Primary Containment Isolation Valve Position (Type B). Due to the extensive review required for this variable, an additional 6 months will be required to complete this review. A report addressing all variables, except primary containment isolation valve position, will be submitted by January 1, 1984 to the Nuclear Regulatory Commission with the information requested in Section 6.2 of NUREG-0737, Supplement 1. A supplemental report will be submitted by July 1, 1984 for the variable describing the primary containment isolation valve position indication. It should be noted that our ability to provide all of the requested information by these dates is contingent upon the delivery of the necessary equipment qualification information which has been solicited from the various manufacturers.

The reports to the Nuclear Regulatory Commission described above will also contain the Peach Bottom APS response concerning the various Regulatory Guide 1.97 variables that are required to be monitored in the Technical Support Center (section 6.1c) and the Emergency Operations Facility (section 6.1d). Data display of the appropriate parameters in the TSC and EOF will be provided by the existing closed circuit television system using remote controlled cameras positioned in the control room.

To date, the review has identified some possible modifications needed to meet the intent of R.G.1.97. For all but one of the Peach Bottom APS Plant unique Type A variables, modifications have already been initiated or completed to upgrade or replace existing equipment. For the remaining Type A variable (Drywell Temperature) only a partial modification to provide environmentally qualified drywell temperature monitoring equipment has been initiated. The remainder of the required upgrading, if any, for this variable will be addressed upon completion of the BWR Owners' Group Study on inadequate core cooling.

For the variables (with the exception of the neutron flux variable) for which the review has identified the need for modifications, the proposed schedule is to complete the modificationsby the second refueling outage for each unit following the Fall 1983 Unit 2 refueling outage. The modifications involve:

1. Replacement of various flow, level, and pressure transmitters and indicators for equipment qualification reasons.

2. New instrumentation systems due to the absence of existing equipment, or an inability of the existing equipment to meet many of the category requirements for that variable.

It should be noted that the dates provided above are the best estimate as to the time required to implement the necessary modifications. These dates are contingent upon material or equipment availability, and the expected number of modifications resulting from further review of R.G. 1.97. These expectations include the acceptance by the NRC of six possible exceptions to

the guidance provided in R.G. 1.97 that we are planning to request in our January 1, 1984 submittal.

The specific variables involved are:

1. Drywell Sump Level
2. Containment Sump Sampling
3. Radioactivity Concentration in the Primary Coolant
4. Radiation Exposure Rate (Area Radiation Monitors)
5. Cooling Water Temperature and Flow to ESF Components
6. Primary Containment Hydrogen Concentration (Range).

The first four exceptions are in agreement with the report submitted by the BWR Owners' Group to the NRC titled "BWR Owners' Group Position on NRC Regulatory Guide 1.97, Revision 2." The remaining two exceptions are unique to Peach Bottom APS. These exceptions, along with technical justifications, will be detailed in our submittal to the NRC.

The above schedule is not applicable for the variable "Neutron Flux". The review thus far has shown that a major modification or an exception to the guidance provided in R.G. 1.97 is needed to meet the requirements of the Regulatory Guide. Cost estimates run between one and two million dollars per unit to upgrade the present system. Since there is no commercially available system, PECo. is currently involved with a manufacturer of neutron monitoring equipment (Gamma Metrix) to develop an ex-core neutron detection system. A prototype has been installed in the Peach Bottom Unit 2 primary containment. General Electric is currently developing an in-core system. When these systems are fully developed, PECo. will submit a proposal regarding this requirement.

ATTACHMENT IV

Upgrade Emergency Operating Procedures
(Response to the criteria in Section 7 of NUREG 0737, Supplement 1)

NRC Requirements:

1. Provide human factored, function oriented, emergency operating procedures for mitigating the consequences of a broad range of initiating events and subsequent multiple failures or operator errors, without the need to diagnose specific events.

2. In accordance with NUREG-0737, Item I.C.1, re-analyze transients and accidents and prepare Technical Guidelines.

3. Upgrade Emergency Operating Procedures to be consistent with Technical Guidelines and an appropriate procedure Writer's Guide.

4. Provide appropriate training of operating personnel on the use of upgraded EOPs.

5. Implement upgraded EOPs.

PECO's Response

In response to the requirement for improved emergency operating procedures that address a broad range of initiating events without the need to diagnose specific events (currently specified by NUREG 0737, Item I.C.1), the BWR Owners' Group formed a committee to develop generic guidelines. Philadelphia Electric Company has actively participated in this program for developing Emergency Procedure Guidelines (EPGs) since this effort was initiated in the Summer of 1979. The EPGs, Revision 2, was submitted by the Owners Group to the NRC on June 1, 1982, followed by an errata on October 4, 1982. Subsequently, the NRC has approved Revision 2 of the EPGs by correspondence dated February 8, 1983 (D. G. Eisenhut to All BWR Licensees of Operating Reactors).

NUREG 0737, Item I.C.1, until recently, required licensees to revise and implement their emergency procedures during the first refueling outage after January 1, 1982, following NRC approval of

the guidelines. In March of this year we implemented the new Peach Bottom Emergency Procedures for both Unit 2 and Unit 3 following the completion of a thorough procedural development program as described later in this section. The timely implementation of these procedures was a result of our desire to comply with the original schedule presented in NUREG 0737; and our belief that Revision 2 of the EPGs identified significant improvements that should be expedited in the interest of enhancing operator response to plant transients and accidents. Actual implementation of the emergency procedure was held up until final NRC approval of the EPGs was received, and until we had an opportunity to discuss this matter with the Peach Bottom NRC project manager and resident inspector. Our intentions of implementing the procedures in a timely manner was previously brought to the attention of the NRC in correspondence dated May 14, 1982 (S. L. Daltroff to D. G. Eisenhut). A description of the procedural development program follows:

Technical Guidelines

The new procedures conform to Revision 2 of the BWR Owners Group EPGs. Plant specific procedures were written using Appendix C of the EPGs which provides the method for calculating plant specific information (setpoints, limits, curves) for incorporation into the procedures.

Writing Procedures

The new Peach Bottom emergency procedures are designated as TRIP procedures (Transient Response Implementation Plan). The TRIP procedures were written by a Writers Team made up of Peach Bottom senior licensed operators who were also members of the BWR Owners Group Emergency Procedure Guidelines Committee. The TRIP Procedures were written using the Functional Flow Chart Method of presenting directions to the operator instead of using Prose Paragraph Method of presentation. Our research at the beginning of this project indicated there was very little direction available for any procedures and none available for emergency operating procedures using the Functional Flow Chart Method of presenting the information. Members of the Writers Group attended a seminar by the XYZYX Corporation and referenced some work done for the Department of Energy by Dr. Nertney of the EG&G Corporation.

The members of the Writer's Team participated in all aspects of the TRIP procedure development, including the BWR Owners Group EPG committee, and the validation and training program. Considering this manpower continuity in the development of the emergency procedures, and the fact that the procedures are already developed, a pre-implementation writer's guide does not appear to be appropriate. However, a plant administrative procedure is being developed to provide writer's guidance for implementing future revisions to the TRIP procedures. This procedure will be available for your review before October 31, 1983.

Validation of Procedures

Calculations to determine setpoint limits and to derive the curves for use in the TRIP procedures were first performed by on-site personnel. Next an independent set of calculations was performed by the Mechanical Engineering Division with the assistance of General Electric and Bechtel. Confirming calculations were then performed by an independent source in Mechanical Engineering. This method of independent calculations by three separate groups was utilized to verify that the limits, setpoints, and curves used in the TRIP procedures were correct.

A walk-thru of the TRIP procedures in the Peach Bottom control room was performed by a member of the Writers Group. An additional walk-thru in the Peach Bottom control room was performed independently by a Shift Technical Advisor and Shift Supervisor. The purpose of these walk-thrus was to verify that required instrumentation is available, that the curves and limits used in the TRIP Procedures can in fact be read on meters or recorders with acceptable accuracy, and that the steps and actions required by the TRIP Procedures can in fact be performed in the Peach Bottom control room.

The procedure drafts were exercised on the Limerick training simulator by the Writing Group who were all Peach Bottom senior licensed operators. Revisions were made to correct human factor concerns and operation difficulties. During simulator exercises procedural steps which were difficult or caused errors were revised to eliminate the problems.

Next, simulator exercises were conducted with Limerick Shift Supervision personnel who were simulator certified and had previously been Peach Bottom senior licensed operators. Their comments from the tabletop review and the simulator exercises were incorporated into the revisions.

A Human Factors Checklist was generated by Electric Production Quality Assurance personnel. Human Factors Checklists from the NRC, XYZYX Corporation, and Sandia were used as source material for generating the Human Factors Checklists. The Human Factors Checklist included a tabletop review as well as observation of the operators using the TRIP Procedure during simulator exercises. All comments generated by QA were resolved.

The General Physics Corporation Human Factors Group of Columbia, Maryland had produced a procedure for validation of Emergency Operating Procedures using simulator switch operation output, TV taping and observation by human factors experts. General Physics desired to exercise their validation method to assure that it would, in fact, work. This exercise was performed at the simulator using Peach Bottom operators. The exercise included the use of one Operational Transient Procedure, T-100 - the Reactor Scram Procedure, and T-99 - Post Scram Restoration Procedure. General Physics produced a report and all their concerns in their report have been resolved.

The TRIP Procedures have also been reviewed in detail by the Plant Operations Review Committee and by a subcommittee of the Operations and Safety Review Committee. All of their comments have been resolved.

Operator comments during the tabletop review of procedures during the training period at the simulator and those comments which occurred during the simulator exercises have also been incorporated into the procedures as appropriate.

Operator Training

The Peach Bottom licensed operators received a one week training program at the Limerick Training Simulator on revision E of the TRIP Procedures. The training was conducted by members of the Writers Group and by a General Physics Human Factors Group

instructor. Subsequently, the operators received a one day training session on the procedures during the normal requalification program to update them on the changes in the TRIP procedures between Revision E and the final approved procedures.

A group of nine scenarios were developed to exercise the shift supervision in the use of the TRIP procedures. These scenarios included most Operational Transient Procedures and all of the TRIP procedures. Each Shift Supervisor and Shift Superintendent was trained using table top exercises of the scenarios. The instructor used a check list to verify that the trainee: (1) recognized entry conditions and entered the correct procedure, (2) exited procedures and entered other procedures as directed, (3) properly read and understood each step, (4) properly read and understood each caution and note, (5) was able to properly execute procedures concurrently, and (6) was able to use and understand graphic information. Approximately four hours of training was given each trainee.

Applicability of Regulatory Guide 1.33

Section 6.8.1 of the Peach Bottom Technical Specifications requires written procedures that conform to the requirements of Regulatory Guide 1.33. The Guide describes an acceptable method of complying with the requirement for written procedures. Included in the list of procedures are event oriented emergency and transient response procedures. The new symptomatic procedures (TRIP Procedures), developed in response to the requirements of NUREG 0737, Item I.C.1, address plant conditions resulting from a wide spectrum of events, and therefore meet the intent of Regulatory Guide 1.33 for most of the event oriented procedures. Event oriented procedures will remain for those events not covered by the TRIP procedures. It is our intention of deleting the Peach Bottom event oriented procedures for events covered by the TRIP Procedures.

Conclusion

As described above, the symptom oriented emergency procedures for the Peach Bottom Atomic Power Station comply with the requirements of NUREG 0737, Item I.C.1. The procedures will be revised further as needed to reflect NRC approval of future revisions to the BWROG Emergency Procedure Guidelines.

ATTACHMENT V

Emergency Response Facilities
(Response to the criteria in Section 8 of NUREG-0737, Supplement 1)

Section 8 of NUREG 0737, Supplement 1, identifies the requirements for the Technical Support Center (TSC), Emergency Operations Facility (EOF), and Operational Support Center (OSC). A description of the design and operation of the Peach Bottom Emergency Response Facilities is provided in the following documents:

(1) Peach Bottom Atomic Power Station Emergency Plan, September, 1982.

(2) Correspondence dated January 2, 1980; S. L. Daltroff, PECo, to H. R. Denton, NRC; enclosure 8.

(3) Correspondence dated April 3, 1981; J. W. Gallagher, PECo, to D. G. Eisenhut, NRC.

(4) Correspondence dated June 1, 1981; S. L. Daltroff, PECo, to D. G. Eisenhut, NRC.

(5) Correspondence dated February 2, 1982; V. S. Boyer, PECo, to R. C. Haynes, NRC.

(6) Correspondence dated December 6, 1982; S. L. Daltroff, PECo, to J. F. Stolz, NRC.

The Peach Bottom EOF and TSC are located on the second and third floor, respectively, of the former Unit 1 Administration Building. Additional shielding, and a dedicated HVAC system utilizing HEPA and charcoal filtration, have been provided to establish habitability control to the same degree provided the main control room for postulated accident conditions. A backup emergency power supply is available with sufficient capacity to feed all the essential loads at the TSC and EOF. Data display of vital parameters is provided via a closed circuit television system using remote controlled cameras positioned in the control room. The reader should consult references 1,2,4, and 6 for design details of the TSC and EOF. The emergency response facilities were successfully demonstrated during the June 16, 1982, emergency plan exercise. The facilities meet the requirements of NUREG 0737, Supplement 1, except as noted below:

Exceptions

1. Staffing for Plant Emergencies - Additions within 30 Minutes

Section 8.4.1.i (Table 2) stipulates the minimum staffing requirements for nuclear power plant emergencies. Philadelphia Electric previously proposed, in a letter dated April 3, 1981 (reference 3), an alternative to the NRC staffing criteria that meets the intent of Table 2 in NUREG 0737, Supplement 1. Following their review of our proposal, the NRC staff requested additional information regarding our exception to the 30 minute augmentation for emergency staffing (letter dated December 24, 1981, R. C. Haynes, NRC to V. S. Boyer, PECo.). By letter dated February 2, 1982, (reference 5), we provided additional information to confirm compliance with the intent of the NRC staffing criteria. Part of the basis for the alternative staffing proposal was our commitment to assign additional personnel to the on-shift complement in lieu of 30-minute shift augmentation. Consequently, the on-shift staffing to meet plant emergencies exceeds the requirements of Table 2. The staffing as proposed was implemented prior to July 1, 1982.

As an alternative to the NRC criteria in Table 2, we proposed to provide on-shift personnel, in lieu of 30 minute call-ins for those who would be expected to perform necessary tasks within 60 minutes after an emergency had been declared, and established a 60 minute arrival period for the other personnel. This proposal was based on our assessment that 30 minute augmentation was not feasible due to the commuting time requirements of most plant employees. The area demographic and environmental characteristics that favors the siting of a nuclear facility has the effect of discouraging employees from situating in the immediate vicinity of the facility. The 30 minute response time would require personnel to live within 5 miles of the facility considering the time required to conduct the off-site personnel notification, plus the time for individuals to prepare themselves and travel to the plant. The imposition of such requirements would force limitations on the housing and behavioral patterns of individuals. This would have an adverse effect on morale, result in a loss of experienced personnel, and further aggravate the industry's problems in attracting additional qualified personnel.

Justification of the minimum staffing requirements proposed in our April 3, 1981 letter follows.

a. Table 2 Requirement: 30 minute call-in for notification/communication function.

Response: We proposed to meet this requirement by assigning an additional communicator to each shift since we consider the function to be essential during the early phase of an emergency. Therefore, our proposal is more conservative than Table 2.

b. Table 2 Requirement: Provide the following electrical maintenance/instrument and control support for performing maintenance.

On Shift: 1**
30 min. capability: 2
60 min. capability: 1
** may be provided by shift personnel assigned other functions.

Response: The Table 2 criteria requires human resources in this functional area of two man-hours during the first hour of the emergency. Additionally, the table does not require the on-shift support to be exclusively dedicated to this function. The PECO proposal specified two on shift personnel and two 60 minute call-ins. This provides an equivalent resource of two man-hours during the first hour. Further, all personnel are dedicated exclusively to this function. We consider our proposal to be at least as conservative as the Table 2 criteria.

c. Table 2 Requirement: Technical support in the area of core/thermal hydraulics is required within 30 minutes.

Response: The proposal in the April 3, 1981 letter meets the intent of the Table 2 criteria. We proposed additional personnel with this technical knowledge within one hour in lieu of 30 minutes. Additionally, Peach Bottom has at least six individuals on shift with formal training in the subjects of heat transfer, hydraulics and thermodynamics (shift superintendent (1), shift supervisor (1), control room operators (3), STA

(1)). The STA is a graduate engineer and will provide the technical engineering support needed during the first hour of the accident. Therefore, the Peach Bottom on-shift staff currently possesses the necessary expertise to handle all response activities during the first hour.

d. Table 2 Requirement: Provide the following staff to perform on-site and in-plant surveys.

On-shift: 1
30 min. capability: 2
60 min. capability: 2

Response: The Table 2 criteria requires human resources of two man-hours during the first hour to perform these tasks. The PECO proposal specified two on-shift H.P. technicians and three 60 minute call-ins. This provides an equivalent resource of two man-hours during the first hour and therefore meets the intent of the NRC criteria.

e. Table 2 Requirement: Provide the following staff to perform off-site dose assessment, off-site surveys, out-of-plant surveys, access control, maintenance coverage, search and rescue, personnel monitoring, and dosimetry.

On-shift: 0
30 min. capability: 5
60 min. capability: 4

Response: The April 3, 1981 letter proposed a 60 minute call-in of nine health physics personnel to perform these tasks. We believe that this response capability, along with the on-shift operating staff, is sufficient for handling accident situations during non-outage, weekend and back-shift periods. The basis for this conclusion is provided below:

i) The off-site dose assessment is performed by shift supervision during the initial phase of the accident using procedure EP-316 and data from installed instrumentation. The results of this assessment are forwarded to the various emergency response agencies for use in initiating the appropriate protective measures. The effectiveness of the assessment technique has been demonstrated during previous emergency drills. Computerized dose calculation capabilities will be operational

in the near future to enhance the speed and accuracy of this assessment. Consequently, senior health physics expertise and H.P. technicians are not required during the first hour for the initial dose assessment and off-site surveys.

ii) The extent to which H.P. technician support is needed for access control, maintenance coverage, search and rescue, first aid, personnel monitoring and dosimetry is a function of the number of personnel working on site and the type of activities in progress. The NRC criteria appears to provide for periods of significant maintenance activity. During a regular Company work day, and during periods of significant maintenance activities, there are more than sufficient H.P. personnel available to perform these functions if an emergency should occur. The need to perform these functions would be limited if an emergency should occur at a time when there are fewer personnel working in the plant, such as weekends and backshifts with little or no maintenance in progress. In this situation, the two H.P. technicians identified in item d above would have sufficient time to perform these functions to the extent that they are needed during the first hour.

The NRC staffing criteria for H.P. technicians appears to provide for tasks that are better performed by the licensed operators using installed instrumentation, and for periods of significant maintenance activity. To implement the NRC criteria would involve having a senior health physicist and seven H.P. technicians on shift at all times. Our proposal to increase the on-shift Health Physics coverage, and to call in an additional eleven technicians within an hour would provide the necessary support required during an emergency.

2. Backup Emergency Operations Facility

Section 8.4.1.b (Table 1) requires a backup EOF if the primary EOF is located within 10 miles of the plant. The Peach Bottom EOF is located on the second floor of the former Unit 1 administration building. The building is located approximately 1,000 feet from the centerline between the Unit 2 and Unit 3 structure. Based on the habitability design for the Peach Bottom EOF that exceeds the criteria for habitability identified in Table 1, we request an exception to the backup EOF requirement. The habitability control

system for the EOF has been designed to provide the same radiological habitability as the main control room under accident conditions. This includes a ventilation system utilizing both HEPA and charcoal filters. The current shielding is sufficient for meeting the personnel dose criteria identified in NUREG 0578. For these reasons, we believe that a backup Emergency Operations Facility is not appropriate.

3. Location of Technical Support Center

Section 8.2.b requires the TSC to be located within the site protected area so as to facilitate necessary interaction with control room, OSC, EOF, and other personnel involved with the emergency. The TSC requirement was originally presented in NUREG 0578, issued in the summer of 1979. In response to a letter from H. R. Denton, NRC Director, to all Operating Nuclear Plants, dated October 30, 1979, we immediately initiated action to meet the implementation schedule mandated by NUREG 0578. Specifically, we were required to establish an interim TSC by January 1, 1980, and a permanent TSC by January 1, 1981. In order to meet these NRC commitments, Philadelphia Electric decided to use the decommissioned Peach Bottom Unit 1 Administration Building for the TSC and EOF facilities.

The TSC lies outside, but adjacent to the Unit 2-3 protected area. A cyclone fence around the perimeter of Unit 1 and guard patrols provide security for the TSC. We request exception to the TSC location criteria of section 8.2.b based on the following:

a. The close proximity of the TSC to the control room was recommended according to NUREG 0696 to facilitate face-to-face interaction between control room personnel and the senior plant manager working in the TSC. The Peach Bottom TSC will have dedicated telephone communications with the control room, personnel dedicated to communications assigned to the control room, and a closed circuit TV system for monitoring plant status. Additionally, the presence of the Shift Technical Advisor in the control room should enhance communications between the control room and the technical staff located in the TSC. These provisions will provide satisfactory compensation for the planned location of the Peach Bottom TSC.

b. Dedicated motor vehicles are available for transporting personnel between Unit 2-3 and the TSC building.

c. The location of the TSC is ideally situated by being accessible from both Unit 2-3 and a public road. The latter enhances TSC accessibility to offsite support personnel such as (1) offsite engineering and management personnel, (2) vendors, architect engineers, and consultants, and (3) representatives from the Federal, State, and Local agencies.

d. The location of the Peach Bottom TSC and EOF in the same building has the distinct advantage of enhancing the interface between personnel assigned to these facilities, and promotes greater flexibility in the availability and utilization of personnel in responding to an emergency.

Based on the preceding discussion, we believe that the exceptions to the requirements of NUREG 0737 are reasonable, do not compromise the function of the emergency response facilities, and have received adequate compensatory measures. Therefore, we request that the emergency response facilities be accepted as currently designed, and demonstrated during the past NRC emergency drill, without further changes.

Docket Nos. 50-277
50-278

ATTACHMENT VI

Description of Meteorological Monitoring System

The Peach Bottom Meteorological Monitoring System is being upgraded to comply with Regulatory Guide 1.23, proposed Rev. 1 and NUREG-0654 criteria. The primary instrumentation is located on the microwave tower which is situated on a hill top a short distance northeast of the off-gas stack (Weather Tower No. 2). A backup weather tower (Hill Pole) is installed to supply data in the event that the primary weather tower is inoperable. Any wind patterns caused by channeling or draining flow into the river valley are monitored by sensors installed on a transmission line tower located in the river (River Tower). The data is telemetered by radio to the primary weather tower, then by cable to the control room. Supplemental data is collected at Weather Tower 1A located on the shoreline a short distance south of the generating station.

The locations of the weather towers are shown on Figure 1. Table 1 is a list of the sensors and respective elevations above ground. All sensors are being upgraded to meet the sensitivity and accuracy requirements of Regulatory Guide 1.23, Proposed Rev. 1. All Tower 1A, Tower 2, and River Tower data are recorded on strip-charts located in shelters at the base of the respective tower and on strip-charts in the control room. Data from the Hill Pole is recorded on strip-charts in the control room only. In addition, all data is processed by a control room data-logger which generates a printout of 15 min. and 60 min. averaged meteorological parameters. This system provides sufficient redundancy to ensure that the meteorological data required by operating personnel for environmental radiation dose assessment is available.

All of the meteorological data is transmitted from the control room data-logger to a Nuclear Data ND6650 computer located on the first floor of the Emergency Operations Facility/Technical Support Center located at Unit 1. The data is accessible from a CRT terminal in the EOF and by the appropriate federal and state agencies by means of telephone lines to the ND6650 computer. The Meteorological Monitoring System is illustrated in Figure 2.

This system is presently in service, as described, with the following exceptions:

1. Wind instrumentation at the 30 feet elevation, Tower No. 2, is not installed.

2. Dew point sensor, Tower No. 2, is not installed.

3. Wind instrumentation at 75 feet and 320 feet elevations, Tower No. 2, does not satisfy Regulatory Guide 1.23, Proposed Rev. 1. The instrumentation is accurate to within ±1.0 mph (greater than 10 mph) vs. required accuracy of ±0.5 mph for all speeds; starting wind speed is 1.8 mph vs. required starting speed of 1.0 mph.

4. Tower No. 2 data is not recorded on strip-charts at the base of the tower. It is recorded in the control room on strip-charts and processed by the data-logger.

The necessary instrumentation to eliminate these exceptions will be installed by May 31, 1983. The new meteorological monitoring system will be operational in time for its utilization during the annual emergency drill in June, 1983.

The primary Class A dose model for Peach Bottom is currently operational on the PECo corporate computer located in Philadelphia with access through a CRT terminal located in the EOF.

The Class A dose assessment model is a straight line continuous point source Gaussian distribution model. This model was developed specifically for PBAPS and has the following capabilities:

1. corrects effective plume height for site specific terrain

2. calculates Vent Plume rise based on model developed by PBAPS Vent Plume Behavior Study

3. can process doses for up to 300 receptor locations in each of 16 polar sectors radiating from the point of release

4. variable time step (optimum 15 min.)

5. uses modified Brookhaven turbulence classification

6. downwash from vent release is calculated

7. X/Q's and doses from 3 simultaneous sources can be determined when required

8. calculates cross wind distance to 10% of plume centerline contration

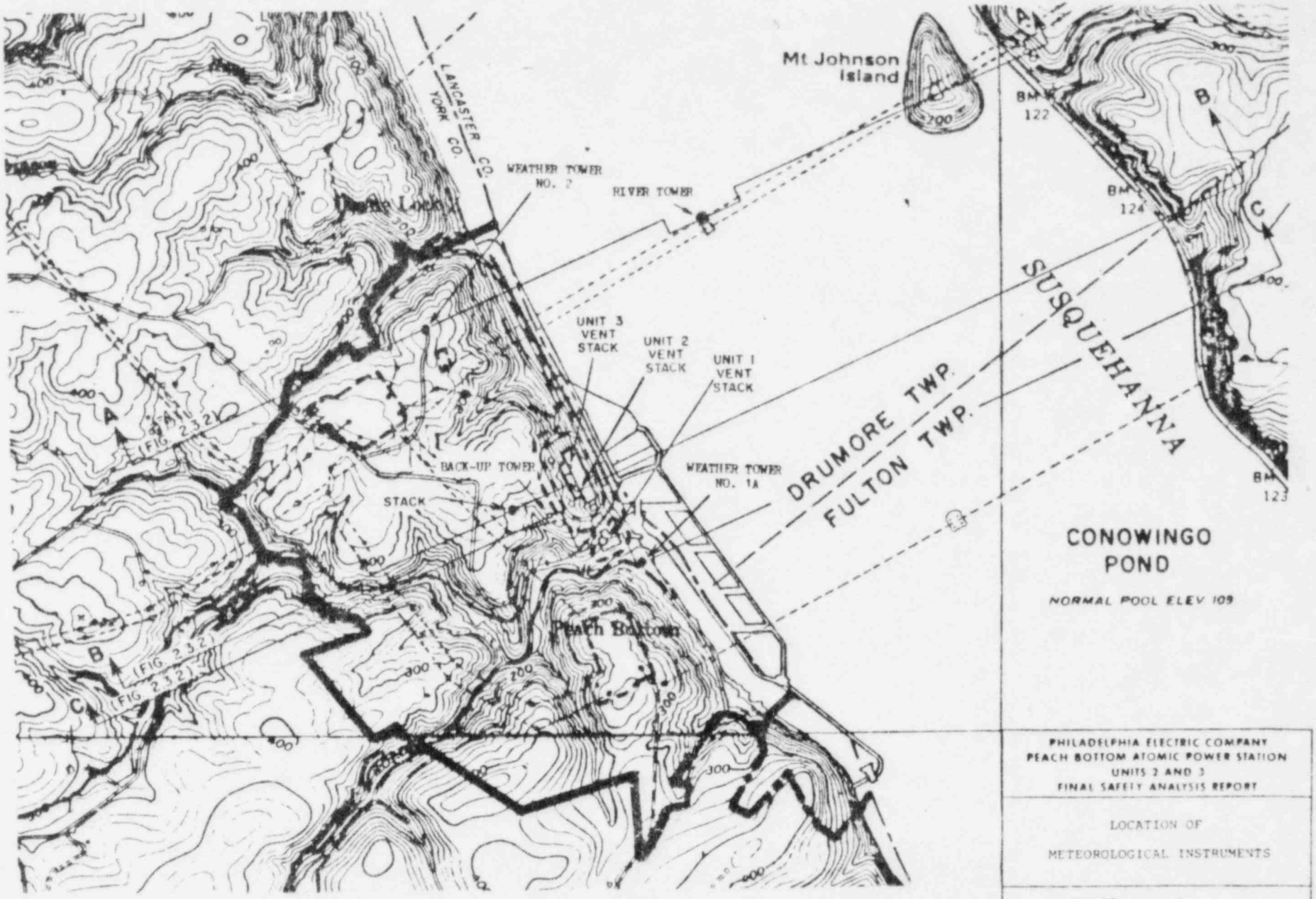
9. calculates the following doses to 50 miles

    a. Iodine - inhalation and ingestion
    b. Noble gas - skin and whole body
    c. Shine from elevated plume (out to 3.9 miles)

10. maintains and updates historical cumulative doses at all receptor locations in each of the 16 sectors from the beginning of the release.

TABLE 1: ELEVATIONS OF METEOROLOGICAL SENSORS

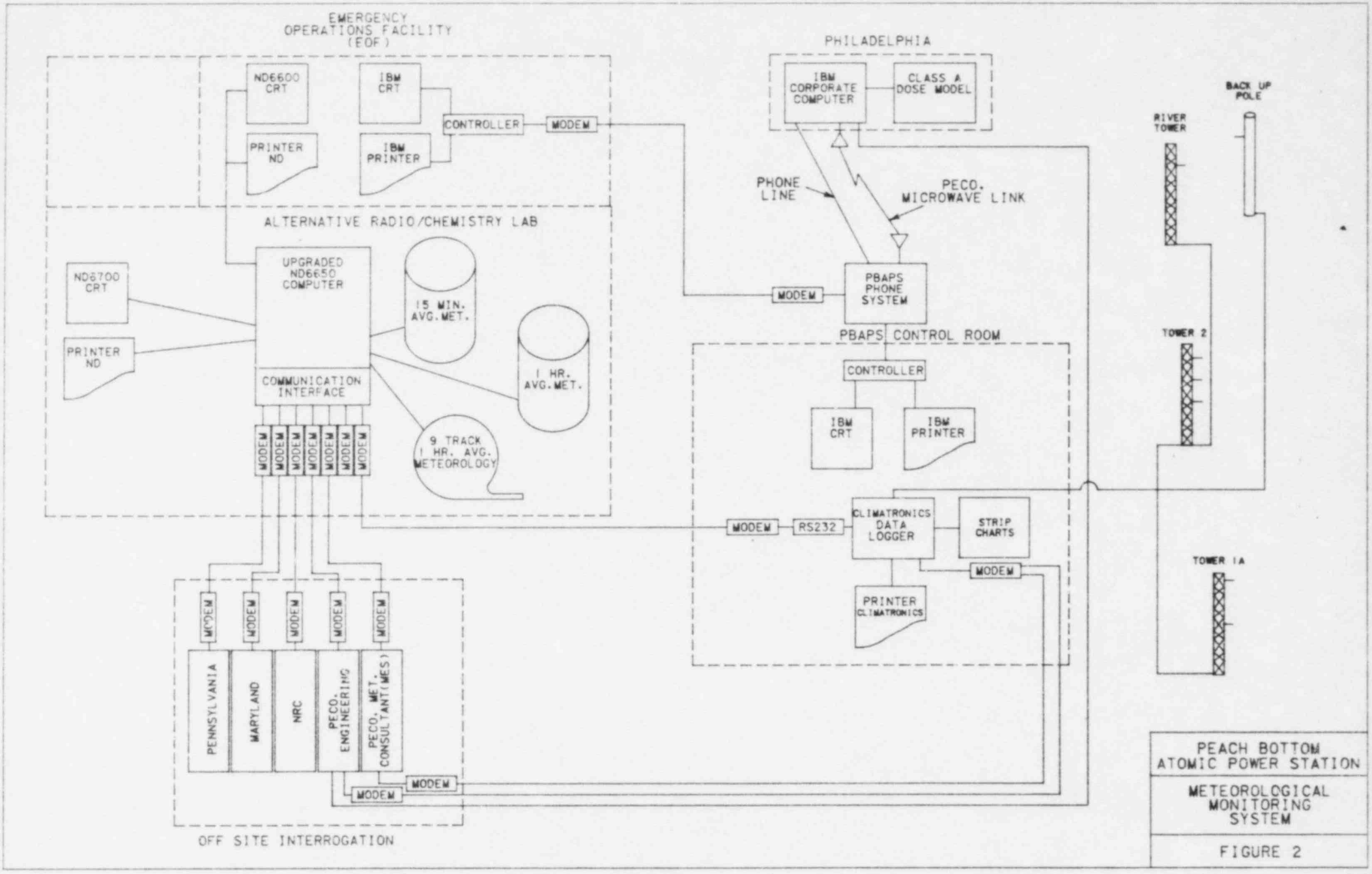
SENSOR	ELEVATION (ground)
TOWER 1A	
2 wind speed	30' & 92'
2 wind direction	30' & 92'
2 temperature	30' & 89'
1 rain gage	9'
1 dew point	30'
RIVER TOWER	
1 wind speed	55'
1 wind direction	55'
BACK UP POLE	
1 wind speed	30'
1 wind direction	30'
TOWER 2	
3 wind speed	30', 75', & 320'
3 wind direction	30', 75', & 320'
3 temperature	30', 146', & 316'
1 dew point	30'
1 rain gage	7.5'



PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM ATOMIC POWER STATION
UNITS 2 AND 3
FINAL SAFETY ANALYSIS REPORT

LOCATION OF
METEOROLOGICAL INSTRUMENTS

FIGURE 1



PEACH BOTTOM ATOMIC POWER STATION

METEOROLOGICAL MONITORING SYSTEM

FIGURE 2