CP&L

Carolina Power & Light Company

SERIAL: LAP-83-111

May 2, 1983

Director of Nuclear Reactor Regulation
Attention: Mr. D. B. Vassallo, Chief
Operating Reactors Branch No. 2
Division of Licensing
United States Nuclear Regulatory Commission
Washington, DC 20555

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324
LICENSE NOS. DPR-71 AND DPR-62
APPENDIX R - ADDITIONAL INFORMATION CONCERNING EXEMPTION REQUESTS AND ALTERNATE SHUTDOWN CAPABILITY

Dear Mr. Vassallo:

Carolina Power & Light Company (CP&L) appreciates the opportunity to provide clarifying information concerning our pending requests for exemption from 10 CFR 50.48 and Appendix R to 10 CFR Part 50 and to describe our plans and schedule for completing study of and commencing of an alternate shutdown capability for the Brunswick Steam Electric Plant (BSEP) Units 1 and 2. The substance of this letter and its attachments have been discussed with the Nuclear Regulatory Commission (NRC) in working level meetings. In addition, Mr. P. W. Howe, Vice President, Brunswick Nuclear Project and Mr. A. B. Cutter, Vice President, Nuclear Plant Engineering have described CP&L's plans and schedule to NRC management, Mr. R. H. Vollmer and Mr. R. A. Purple via telephone conference on April 22, 1983 and obtained approval in principle of those plans and schedule from Mr. Vollmer.

In the Draft Safety Evaluation Report dated January 31, 1983, the Staff concluded that of the 78 exemptions which CP&L has requested, eight (8) exemption requests should be granted; twenty-six (26) exemption requests should be denied, and forty-four (44) exemption requests required further clarification by CP&L.

Attachment 1 to this letter describes in detail CP&L's proposal for disposition of the 78 original exemption requests. In summary, we are prepared to withdraw twelve (12) exemption requests. We are requesting resolution of nine (9) exemption requests in accordance with the methods of resolution which have been discussed and substantually agreed to in working level meetings between your staff and CP&L, and requesting deferral of fifty-seven (57) exemption requests under 10CFR50.48, pending the outcome of the alternate shutdown capability study.

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Attachment 2 provides details and our tentative schedule for performing the alternate shutdown study.

Attachment 3 provides a history and brief description of the modifications made to date in meeting Appendix A to Branch Technical Position 9.5-1 and Appendix R fire protection requirements. It also summarizes the existing fire protection features at BSEP. This information clearly shows the dedicated effort CP&L has made in responding to fire protection requirements, while demonstrating that public health and safety will be protected during the period of time it takes to perform the alternate shutdown capability study and subsequent modifications for the Brunswick Steam Electric Plant.

To facilitate your review of the information we are providing in the attachments, we have prepared the attached Executive Summary which summarizes each of the attachments.

If you have any questions regarding this letter, the executive summary, or the attachments, please feel free to contact us.

Yours very truly,

P. W. Howe

P. W. Howe
Vice President
Brunswick Project

MSG/pgp (6663MSG)
Attachments

cc: Mr. D. O. Myers (NRC-BSEP)
Mr. J. P. O'Reilly (NRC-RII)
Mr. S. D. MacKay (NRC)
Mr. R. H. Vollmer (NRC)

EXECUTIVE SUMMARY

## Introduction

In its June 30, 1982 submittal, Safe Shutdown Capability Assessment and Proposed Modifications, 10 CFR 50, Section III.G, Appendix R, Carolina Power & Light Company (CP&L) requested exemptions consistent with a proposed safe shutdown approach based on shutdown from the control room except for a fire in the control room or cable spread rooms. The proposed shutdown from the control room involved many cables which did not meet all of the specific requirements of Appendix R to 10 CFR 50. Due to physical constraints and engineering considerations, it was determined to be extremely difficult to achieve compliance with some of the specific requirements of Appendix R and that under such an approach seventy-eight (78) exemptions from these specific requirements would be needed.

Based upon the Staff's preliminary evaluation in their January 31, 1983 Safety Evaluation Report, it appeared that a majority of the exemptions requested would not be approved. As a result and in order that all outstanding Appendix R issues at Brunswick can be resolved, CP&L has elected to pursue the study and implementation of an alternative shutdown system. By using an alternative shutdown system (manual and remote operations from outside the control room) the number of cables which present a separation concern will be minimized and the scope of exemption requests will be reduced.

## Attachment 1

In our June 30, 1982 submittal, we requested seventy-eight (78) exemptions from 10 CFR 50, Appendix R. We are now withdrawing twelve (12) items because we believe twelve (12) of these are no longer needed. With respect to the remaining sixty-six (66), we are making modifications to four fire zones which will place us in compliance with Appendix R; requesting Staff resolution on nine (9) items, and requesting deferral of fifty-seven (57) items under 10 CFR 50.48. We are requesting the latter group of exemptions be deferred because we are uncertain how our Alternate Safe Shutdown Capability Analysis will affect the eight (8) zones to which they relate.

Our proposal for disposition of the seventy-eight (78) exemption requests have been discussed in working level meetings with the Staff.

For the four (4) fire zones which will require modifications, CP&L commits to the following installation dates.

### Fire Zones DG-11 and DG-14

(1) Two (2) equipment hatches in the Diesel Generator Building will be modified to rated barriers, in accordance with Appendix R, by November 30, 1984.

Fire Zones CB-5 and CB-6

(2) A manually operated, fixed sprinkler system will be installed in the cable spread room (Units 1 and 2) by June 30, 1985.

Attachment 2

The proposed Alternate Safe Shutdown Capability Analysis will require twelve (12) months to complete. This twelve-month period is the minimum amount of time within which CP&L can responsibily complete the analysis and is predicated on: 1) the substantial analysis scope; 2) completing responsible multi-department reviews and approvals; 3) development of a computer data base management system to support the analysis effort as well as control of future plant modification work.

The analysis will be submitted no later than April 30, 1984.

Preliminary engineering will commence upon submittal of the analyses to NRC. We will initiate detailed design (e.g. specifications, procurement, etc.) upon approval of our analysis submittal and institute a continuous program of engineering and implementation at that time. Installation of our Alternate Shutdown work will begin no later than early 1985. Additionally, we will provide quarterly progress reports commencing three (3) months after approval of our Alternate Safe Shutdown Capability Analysis.

CP&L believes that, in evaluating this information, the NRC should recognize the inherent protection currently afforded by the existing fire protection features installed at Brunswick in response to Appendix A to Branch Technical Position 9.5-1 fire protection and approved under our SER Appendix A to Branch Technical Position (BTP) 9.5-1. BSEP was the first plant to receive a fire protection SER. These existing fire protection features provide suppression and detection for all major safe shutdown components (e.g. pumps, diesel generators, etc.).

Attachment 3

We believe that CP&L's efforts in response to Appendix A in conjunction with plant modifications already completed to comply with Appendix R (e.g. second emergency lighting system; Fire Zones DG-2, DG-3, and DG-5; two modifications to coordinate associated circuits to shutdown equipment, etc.) will assure the protection of the public health and safety is maintained during the time it takes to perform the Alternate Safe Shutdown Capability Analysis and subsequent Appendix R modifications.

Verification

Subsequent to submitting the enclosed information, CP&L will continue its verification of the information provided to the NRC staff. In the event that the need for clarification of the information is identified, CP&L will provide the necessary information to the NRC staff in a timely manner.

Our staff is available to discuss the enclosed information should you have any questions concerning the Brunswick fire protection program. If additional information is needed with respect to any aspect of the enclosed information, CP&L is prepared to work closely with the staff to identify and furnish such information as expeditiously as reasonably possible.

ATTACHMENT 1

Brunswick Steam Electric Plant
Disposition of Fire Zone Exemptions

This attachment provides our proposed disposition of the seventy-eight (78) original exemption requests. A detailed discussion is provided below. In summary, we are withdrawing twelve (12) items as we believe the exemption requests are no longer needed or modifications will place us in compliance with Appendix R; requesting resolution on nine (9) items, and requesting deferral of fifty-seven (57) items pursuant to 10 CFR 50.48.

I. Withdrawn

A. Fire Zones CB-16, CB-17, CB-18, CB-19, CB-20, CB-21, and CB-22

These fire zones are adjacent and auxiliary to the control room (Fire Zone CB-23). They contain no safe shutdown equipment or cables. Additionally, the in-situ combustible loading in these zones is low and, therefore, present no significant hazard to the control room. These zones contain fire detectors which are annunciated in the control room, but do not contain a fixed fire suppression system.

Two of the above zones (CB-19 and CB-21) have been converted to offices for the Shift Operating Supervisor and Manager - Plant Operations, respectively. Reanalysis of these areas reveal combustible loading has changed to 56,419 BTU/$ft^2$, duration-0.63 hours (Fire Zone CB-19); and 35,575 BTU/$ft^2$, duration-0.4 hours (Fire Zone CB-21).

In a letter dated November 10, 1981, the NRC granted an exemption from requiring a fixed fire suppression system in the control room area for the following reasons:

1) the control room is continually manned;

2) fire detection equipment has been installed generally throughout the control room including in cabinets and other areas not readily visible to operators

3) high risk areas for combustibles such as computer rooms have been separated from the control room by 3-hour fire barriers; and

4) $CO_2$ fire fighting capability is immediately available to operating personnel.

Based upon the foregoing, we believe exemption requests for the referenced fire zones are not needed as they fall under the exemption previously granted for the control room; therefore, withdrawing them.

B. Fire Zone CB-1a

This fire zone contains only Train "B" cables. The north and east walls are non-rated outside walls which cause no concern as no redundant

circuits exist beyond them. The west and south walls are rated barriers with a door in the west wall. An exemption from the Appendix R requirements was requested for lack of a rated fire barrier between Fire Zone CB-1a and the adjoining fire zone to the west, CB-1b, which contains Train "A" circuits. Initial evaluation determined the door to be non-rated. However, reevaluation determined the door to be a rated barrier; therefore, the rating for the west wall is not compromised.

The Staff has indicated, based upon their preliminary evaluation, a request for exemption may not be needed for this fire zone.

In our reevaluation, we determined Fire Zone CB-1a meets the requirements of 10 CFR 50, Appendix R. Therefore, we withdraw our exemption request.

C. Fire Zones RB-1a (Unit 1), RB-1a (Unit 2)

These zones contain no equipment or cables necessary for safe shutdown. These zones contain a fixed fire suppression system and ionization smoke detectors which are annunciated in the control room.

The Staff has indicated, that based upon their preliminary evaluation, a request for exemption may not be needed for this fire zone.

Since these fire zones contain no safe shutdown equipment or cables and exemptions have been requested for adjoining Fire Zones RB-1-g (S/W), we believe that exemptions for these zones are not needed. Therefore, we are withdrawing them.

D. Fire Zones DG-11 and DG-14

Each fire zone contains only one train of cables in conduit and equipment necessary for safe shutdown. The in-situ combustibles are low in both zones. Postulated transient combustibles for these zones are minimal with a calculated transient and in-situ fire duration of less than one minute. The boundary that separates these areas from adjacent rooms containing safe shutdown equipment of the other train is not a rated barrier pursuant to 10 CFR 50, Appendix R.

Based upon their preliminary review, the Staff denied exemptions for these zones as the boundary (i.e. equipment hatches) separating these areas from adjacent rooms containing safe shutdown equipment of the other train is not a 3-hour rated fire barrier.

We intend to modify the equipment hatches for Fire Zones DG-11 and DG-14 so they meet the fire barrier requirements of 10 CFR 50, Appendix R. We anticipate the modification will be completed by November 30, 1984. Based on the above, we are withdrawing these two exemption requests.

II. Exemption Requests Requiring Staff Resolution

A. Fire Zones CB-5 and CB-6

These fire zones are the cable spreading rooms for Units 1 and 2, respectively. Safe shutdown will be achieved independently of the cable spreading room via remote shutdown capability. These fire zones are defined by walls, floors, and ceilings that are three-hour rated fire barriers. All penetrations entering these zones also have three-hour ratings.

Required fire protection for these zones complies with Section III.G.3 of Appendix R as they possess fire detection instrumentation and remote shutdown capability. The only exception to III.G.3 is that no fixed, fire suppression system exists in either zone.

In their preliminary review, the Staff denied exemption requests for these zones as they do not have fixed, fire protection systems. The Staff also stated a need exists for a suppression system to extinguish exposure fires.

We propose the installation of a manually operated, fixed sprinkler system located below the cable trays for these zones. The suppression systems will be designed to extinguish a transient combustible fire. We believe the proposed manually operated, fixed, sprinkler system will provide protection equivalent to Section III.G.3, 10 CFR 50, Appendix R.

So that we can begin conceptual design work on the proposed sprinkler system, we request Staff concurrence. We anticipate the above system to be operational by June 30, 1985 based upon receipt of Staff concurrence by June 15, 1983.

B. Fire Zones CB-1b, CB-2a, CB-2b, CB-12a, CB-12b, CB-13a, and CB-13b

Fire areas CB-1b, CB-2a, and CB-2b, are located at Elevation 23'-0"; and CB-12a, CB-12b, CB-13a, and CB-13b are located at Elevation 49'-0" of the Control Building. These fire areas are bounded by reinforced concrete walls, floors, and ceiling/roofs and are used as cable vaults. These fire areas are separated from other fire areas in the Control Building by structures with three-hour fire-resistance ratings. These fire areas are effectively sealed and have no ventilation.

These zones will be provided with remote shutdown capability. However, we still wish to pursue an exemption from the requirement of providing a fixed, fire suppression system in these zones. We believe the following information provides justification for our exemption request.

Fire Hazard Analysis

The combustible loading in each of these fire areas consists entirely of PVC jacketing on 5-inch flexible conduits. Each of these 5-inch conduits is coated with Flamemastic. There are no transient combustibles

in these areas because they are infrequently accessed. The combustible inventory and associated fire loadings for these fire areas are as follows:

| | | Classical Fire Hazard Analysis | | | Oxygen Limited | |
|---|---|---|---|---|---|---|
| Fire Area | IN-SITU Combustible Loading BTU x $10^6$ | BTU/ft.$^2$ | Severity (min.) | Volume CF | BTU/SF | Severity (Min.) |
| CB-1b | 6.996 | 19,708 | 15.0 | 33,737 | 1235.4 | 1.0 min. |
| CB-2a | 7.136 | 22,657 | 17.0 | 7,978 | 329.3 | Neg |
| CB-2b | 7.136 | 45,803 | 34.0 | 24,864 | 2075.0 | 2.0 min. |
| CB-12a | 7.136 | 61,623 | 42.2 | 2,200 | 247.0 | Neg |
| CB-12b | 7.136 | 20,104 | 15.0 | 33,737 | 1235.4 | 1.0 min. |
| CB-13a | 10.290 | 30,420 | 22.8 | 6,727 | 247.0 | Neg |
| CB-13b | 7.136 | 53,868 | 40.4 | 24,864 | 2439.0 | 2.0 min. |

The above table shows that using the classical fire hazard analysis approach, the fire severity for these fire areas ranges from a 15.0 minute to a 42.2 minute fire duration (severity). Using the classical approach, in this case, has introduced two major conservatisms as follows:

1. Since these areas are reasonably well sealed and have no ventilation system, any fire would be ventilation or oxygen limited. The above table provides data on the oxygen-limited case and shows that the fire severity and duration is not significant.

2. The basic room geometry for all of these fire areas is a space with a small floor area and a high ceiling (19'-0" or 25'-4"). In this situation, the fire loading in terms of BTU/SF becomes artificially high.

It should be noted that the fire severity of these fire areas is substantially less than that shown in the standard time-temperature curve. Based upon the Electric Power Research Institute test results on electric cable flammability, the room geometry, and the physical arrangement of the combustibles, it can be established that this fire can best be represented by the "A Curve" shown in Figure 5-9E of the NFPA "Fire-Protection Handbook", 15th Edition.

The time-temperature curve for an "A-Curve" fire can be characterized as a slight fire exposure which has a slow buildup of temperature eventually reaching the same temperatures as the standard time-temperature curve."

It should also be noted that the flexible conduit is covered with Flamemastic, a fire-retardant coating. The NFPA Handbook states in part that "The Treatment does, however, retard both the rate of burning and the rate at which fuel is contributed by the treated material". This fire-retardant coating does not reduce the fuel loading of the cables, but significantly increases the amount of energy required to ignite the cables.

In summary, the fire loading in these seven cable vaults at Elevations 23'-0" and 49'-0' of the Control Building can be characterized as follows:

1. The fire loadings for these areas are low and range between 19,708 and 61,623 BTU/square foot.

2. The structural boundaries between these fire areas and other fire areas and zones in the Control Building are more than adequate to contain the fire which has been evaluated using the standard time-temperature curve.

3. The fire loading in these areas can be categorized as slight and is best represented by the "A-Curve".

4. Shortly after the initiation of a fire in any of these fire areas, the fire will become ventilation/oxygen limited.

5. The flexible conduits in these fire areas are covered with Flamemastic, a fire-retardant coating. This fire-retardant coating will significantly increase the amount of energy required to ignite the conduit and will retard both the rate of burning and the rate of fuel contribution to the fire. Additionally, the cables in this fire zone meet the intent of IEEE-383 and, as such, possess good fire resistance and limited propagation characteristics.

Safe Shutdown Systems Analysis

The cable access ways contain only cable; some of which is required for normal safe shutdown from the control room. No equipment is located in the cable access ways. Below is a listing of the Train A and B safe shutdown components or systems which have cable routed through the fire area of concern.

1. CB-1b

| Train A | | | Train B | | |
|---|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. | Cable |
| Unit 1: | | | | | |
| Level XMTR B21-LT-N026A | | X | Level SMTR B21-LT-N026B | | X |
| HPCI Logic | | X | RCIC Logic | | X |
| Diesel Gen. Sys. | | X | RCIC Sys. | | X |
| Ventilating Air Sys. | | X | Instrumentation | | X |
| HPCI Sys. | | X | | | |
| Service Water Sys. | | X | | | |
| RHR Sys. | | X | | | |
| Electrical Distr. Sys. | | X | | | |
| RIP Sys. | | X | | | |
| Instrument Air Sys. | | X | | | |
| Instrumentation | | X | | | |

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 2: | | | | |
| Diesel Gen. Sys. | | X | NONE | |
| RHR Sys. | | X | | |
| Ventilating Air Sys. | | X | | |
| Service Water Sys. | | X | | |
| Electrical Distr. Sys. | | X | | |

2. CB-2a

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 1: | | | | |
| Diesel Gen. Sys. | | X | NONE | |
| RHR Sys. | | X | | |
| Ventilating Air Sys. | | X | | |
| Electrical Distr. Sys. | | X | | |

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 2: | | | | |
| Diesel Gen. Sys. | | X | | |
| Ventilating Air Sys. | | X | | |
| HPCI Sys. | | X | RCIC Sys. | X |
| Service Water Sys. | | X | | |
| RHR Sys. | | X | | |
| Electrical Distr. Sys. | | X | | |
| RIP Sys. | | X | | |
| Instrument Air Sys. | | X | | |
| Instrumentation | | X | Instrumentation | X |

3. CB-2b

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 1: | | | | |
| NONE | | | Diesel Gen. Sys. | X |
| | | | RHR Sys. | X |
| | | | Ventilating Air Sys. | X |
| | | | Electrical Distr. Sys. | X |

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 2: | | | | |
| | | | Diesel Gen. Sys. | X |
| | | | Ventilating Air Sys. | X |
| HPCI Sys. | | X | RCIC Sys. | X |
| | | | Service Water Sys. | X |
| | | | RHR Sys. | X |
| Electrical Distr. Sys. | | X | Electrical Distr. Sys. | X |
| | | | RIP Sys. | X |
| | | | Instrument Air Sys. | X |
| | | | ADS Sys. | X |

4. CB-12a

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 1: | | | | |
| HPCI Logic | | X | RCIC Logic | X |
| | | | Diesel Gen. Sys. | X |
| HPCI Sys. | | X | RCIC Sys. | X |
| | | | Serv. Water Sys. | X |
| | | | RHR Sys. | X |
| RIP Sys. | | X | RIP Sys. | X |
| | | | ADS Sys. | X |
| | | | Instrumentation | X |

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 2: | | | | |
| Diesel Gen. Sys. | | X | NONE | |

5. CB-12b

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 1: | | | | |
| HPCI Logic | | X | RCIC Logic | X |
| Diesel Gen. Sys. | | X | | |
| Ventilating Air Sys. | | X | | |
| HPCI Sys. | | X | | |

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 1 (cont'd): | | | | |
| Service Water Sys. | | X | | |
| RHR Sys. | | X | | |
| Instrumentation | | X | | |
| RIP Sys. | | X | RIP Sys. | X |

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 2: | | | | |
| NONE | | | Diesel Gen. Sys. | X |

6. CB-13a

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 1: | | | | |
| Diesel Gen. Sys. | | X | | |
| Ventilating Air Sys. | | X | | |
| RHR Sys. | | X | NONE | |
| Serv. Water Sys. | | X | | |
| Electrical Distr. Sys. | | X | | |

| Train A | | | Train B | |
|---|---|---|---|---|
| Description | Eqpt. | Cable | Description | Eqpt. Cable |
| Unit 2: | | | | |
| Diesel Gen. Logic | | X | | |
| RIP Sys. | | X | RIP Sys. | X |
| RHR Sys. | | X | | |
| HPCI Sys. | | X | RCIC Sys. | X |
| Ventilating Air Sys. | | X | | |
| Instrument Air Sys. | | X | | |
| Instrumentation | | X | | |

7. CB-13b

| Train A Description | Eqpt. | Cable | Train B Description | Eqpt. | Cable |
|---|---|---|---|---|---|
| Unit 1: | | | | | |
| Diesel Gen. Sys. | | X | | | |
| Ventilating Air Sys. | | X | | | |
| RHR Sys. | | X | NONE | | |
| Service Water Sys. | | X | | | |
| Electrical Distr. Sys. | | X | | | |

| Train A Description | Eqpt. | Cable | Train B Description | Eqpt. | Cable |
|---|---|---|---|---|---|
| Unit 2: | | | | | |
| | | | Diesel Gen. Logic | | X |
| | | | RHR Sys. | | X |
| | | | Ventilating Air Sys. | | X |
| RIP Sys. | | X | RIP Sys. | | X |
| | | | Instrument Air Sys. | | X |
| HPCI Sys. | | X | RCIC Sys. | | X |
| | | | Instrumentation | | X |

III. Exemptions Requesting Deferment

Pending the outcome of the Alternate Safe Shutdown Capability Analysis, we request you defer judgment on the remaining forty-nine (49) exemption requests. We also request the grouping of the eight granted exemption requests (RB-1-d (Unit 1), RB-1-[illegible] (Unit 2), RB-1-g (S/W) (Unit 1), RB-4 (Unit 1), SW-1-b, SW-1-a, DG-8, DG-16) with these forty-nine (49) since we are uncertain how the Alternate Safe Shutdown Capability Analysis will affect these eight (8) zones.

Attachment 2

Schedule for Alternate Shutdown Capability for the Brunswick Steam Electric Plant (BSEP) Units 1 and 2

As discussed with Messrs. Vollmer and Purple on April 22, 1983, we plan to proceed with an alternate safe shutdown capability analysis. We believe the Alternative Safe Shutdown System approach will allow us to identify methods for conducting an orderly, safe shutdown of the affected unit considering an individual fire area (one at a time) utilizing:

1. Manual operations deemed feasible of existing equipment.

2. Remote shutdown local stations outside the main control room.

3. Existing equipment capable of performing the same function which is located outside the fire area under review.

4. Dedicated equipment/component addition(s) if necessary.

This approach will also allow credit to be taken for the inherent flexibility and redundancy in the design of existing systems. Classical approaches will still be considered in resolving identified deviations (i.e., reroute, relocation, barrier, etc.).

The analysis required to support a defined Alternative Safe Shutdown System by each individual fire area will require twelve (12) months to complete. The following elements, which are considered critical, dictate a twelve month schedule:

1) The analysis scope consists of a two (2) unit BWR plant site. Each unit is unique in terms of raceway routing, equipment locations, etc. In order to relate physical configuration of both units to Appendix R criteria, an analysis for each unit as well as the common areas must be conducted.

   The projected work scope will require approximately 25,000 man-hours to be expended with 3200 drawings to be reviewed and/or revised. This represents a commitment of an average of ten (10) people over the entire twelve month period. This resource loading represents, in our opinion, the greatest resource loading which can be applied to the task and still remain effective.

2) Intermediate work products at critical phases in the analysis will continually be developed to document decisions made (i.e. scenario by fire area, recommended resolutions with bases, etc.). This decision-making process will facilitate ongoing work control.

3) Sufficient time must be allotted to allow internal multi-department reviews of intermediate work products. Review and approval of intermediate work products during the analysis process by responsible departments will ensure quality and technical accuracy

of the final product. This will minimize potential rework of the final product at the conclusion of project schedule.

4) A computer data base management program will be developed and used to support the planned analysis effort. Integral to the development of this program is the establishment of necessary elements required to support control of future work pertinent to Appendix R criteria.

Our current plans call for the following activities to be accomplished as set forth below. We will make all reasonable efforts to adhere to the proposed schedule.

- The Alternate Safe Shutdown Capability analysis will be submitted to the NRC by April 30, 1984. In parallel with the Alternate Safe Shutdown analysis, a preliminary engineering effort will commence.

- Upon NRC approval of the Alternate Safe Shutdown Capability Analysis, we will initiate a detailed design effort (specifications, procurement, etc.) and institute a continuous program of engineering and implementation. Installation of the items addressed by the Alternate Safe Shutdown Capability Analysis will be initiated no later than early 1985.

- We will provide the Staff quarterly progress reports beginning three months after the NRC has approved the Alternate Safe Shutdown Capability analysis.

Attachment 3

This attachment provides a synopsis of the history and description of modifications made to date in meeting Appendix A and Appendix R fire protection requirements. It also provides a description of the existing fire protection features at BSEP.

Modification History

On November 22, 1977, the NRC issued a Fire Protection Safety Evaluation Report for the Brunswick Steam Electric Plant (BSEP) Units 1 and 2. With the issuance of Supplement 2 on June 11, 1980, BSEP became the first power plant in the U. S. to receive a completed fire protection SER. To support the findings of the SER required the performance of a significant amount of modification work including upgrading and installation of fire barriers, upgrading of the existing detection systems, installation of additional suppression systems, and upgrading the existing remote shutdown system to provide for shutdown independent of the control and cable spreading rooms.

When Appendix R became effective on February 17, 1981, Carolina Power & Light Company (CP&L) was required to backfit two out of three requirements; Section III.G (Fire Protection of Safe Shutdown Capability) and Section III.J (Emergency Lighting). Section III.O, Oil Collection Systems, did not apply since BSEP operates with inerted containments.

To comply with Appendix R, a second emergency lighting system was installed at a cost of approximately $270,000.

On June 30, 1982, CP&L submitted the Safe Shutdown Capability Assessment and Proposed Modifications, 10 CFR 50, Section III.G, Appendix R. In the submittal, we identified three fire zones (DG-2, DG-3, and DG-5) that required modifications to comply with Appendix R. The modifications were completed within nine months of our June submittal.

Also identified in our June submittal, were modifications required to coordinate associated circuits to safe shutdown equipment. Two of these modifications, which did not require an outage, were installed within nine months of our June submittal. The remaining modifications will be held in abeyance pending the outcome of the Alternate Safe Shutdown Capability Analysis.

Safe shutdown instrumentation required for control and monitoring is connected to the reactor vessel and primary containment via instrument lines. These instrument lines can be manually or automatically isolated for line breaks by operation of Reactor Instrument Penetration (RIP) valves. The replacement of these RIP valves with mechanical excess flow check valves is currently in the engineering phase. This replacement will eliminate electrical cable separation concerns associated with the RIP valves.

The total cost of Appendix A to Branch Technical Position 9.5-1 and Appendix R fire protection modifications to date exceeds $16,500,000.

## Brunswick Steam Electric Plant
## Fire Protection System Summary

The following discusses the application of fire suppression and detection systems to structures containing safe shutdown systems and equipment at the Brunswick Steam Electric Plant Units 1 and 2. The discussion is divided into two sections: the first being a general discussion regarding detection and suppression systems and the second being a specific discussion of application on a structure basis.

In summary, this description of fire protection features demonstrates the public health and safety will be protected during the performance of our Alternate Shutdown Capability Analysis and subsequent modifications.

### GENERAL

A. Detection Systems - All structures containing safe shutdown systems or equipment are provided with fire detection systems throughout with the exception of the primary containments. These systems utilize high sensitivity products of combustion (ionization) detectors except in locations where other detector types (e.g. infrared) are dictated by the hazard. The detectors are installed in accordance with manufacturer recommendations and NFPA 72E (Automatic Fire Detectors). In addition to providing local audible alarms, these detectors provide audible and visual annunciation in the plant's continuously-manned control room. The detection systems are designed to provide local audible and visual indication of circuit faults such as opens, shorts, detectors removed, switches out of position, and loss of power. These indications are also annunciated in the control room. The functioning of this equipment, including each detector, is verified once every six months by testing.

B. Sprinkler systems have been provided in many areas to provide for fire control and suppression. The locations of these systems were based on the degree of hazard present and the impact of a severe fire. These systems were designed with densities of water application as specified in NFPA 13 (Installation of Sprinkler Systems). All sprinkler systems are provided with low temperature sprinkler heads (e.g., 165°F) to provide for early activation. Audible and visual annunication of sprinkler system activation is provided in the control room.

C. Major components of safe shutdown systems (e.g. pumps, diesel generators, etc.) are covered by fixed, automatic fire suppression and detection systems as described in the following area-specific information.

AREA SPECIFIC

A. Reactor Building[1]

The Reactor Building has safe shutdown systems[2] on its lower three elevations (e.g., -17 ft., 20 ft., and 50 ft.),, but is provided with fire detection on all elevations. The reactor building standpipe system feeds hose reels on all elevations. Portable fire extinguishers selected and located per NFPA 10 (Portable Fire Extinguishers), are located on each level.

The -17 foot elevation contains five ECCS systems located in separate areas. Each of these areas is equipped with a sprinkler system except for the HPCI area which contains an automatic $CO_2$ flooding system.

The design point of these sprinkler systems were conservatively selected based on the criteria for an Extra Hazard, Group I, occupancy (e.g., areas where quantity and combustibility of contents is very high, introducing the probability of rapidly developing fixes with high rates of heat release). The required density under this criteria is 0.29 $gpm/ft^2$. The average density provided by the installed sprinkler systems range from 193% to 275% of this value.

The 20 and 50 foot elevations contain safe shutdown cables and motor control centers, and limited amounts of equipment. Sprinklers are provided on these elevations in three outage staging areas (two on 20 foot, one on 50 foot), where relatively high transient fire loadings may occur. These systems provide an average density ranging from 232% to 347% of the design value of 0.19 $gpm/ft^2$.

B. Control Building

The Control Building has safe shutdown systems on two of its three elevations (e.g., 23 foot and 49 foot), but is provided with fire detection on all elevations. Standpipe system hose reels are located on all elevations as are portable fire extinguishers. Each elevation is provided with hose reels from a manually activated $CO_2$ fire fighting system.

C. Diesel Generator Building

The Diesel Generator Building contains safe shutdown systems or equipment on all of its three elevations (e.g., 2 foot, 23 foot, and 50 foot), each of which is provided with fire detection. Additionally, standpipe system hose reels are provided on all elevations as are portable fire extinguishers for use in manual fire fighting.

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[1]This discussion applies to both reactor buildings.

[2]System refers to both mechanical and electrical components (including cable).

The 2 foot elevation contains safe shutdown cables for both units, but no equipment. Recognizing the vulnerability of such cables, this area has a fixed sprinkler system designed to protect the safe shutdown cabling from exposure fires. The sprinkler system was designed assuming the quantity and combustibility of the contents was moderate (the same classification utilized in chemical plants, large stack room areas of libraries, and printing and publishing occupancies). The as-installed system, however, can provide a minimum average of 269% of the design requirement. In addition to the general area coverage, the crossing points of a number of opposite division cable trays are provided with localized sprinkler coverage.

The 23 foot elevation contains four emergency diesel generators and four 480 volt emergency electrical system substations. Each generator and each substation area are isolated from the adjacent areas by three-hour rated barriers (with the exception of Zones DG-11 and DG-14 equipment hatches). Each diesel generator room is protected with full area sprinkler coverage plus localized protection over the fuel oil day tanks and localized protection in the pipe trenches where any spill of combustible liquids (e.g., fuel oil or lube oil) could be expected to flow.[3]

The 50 foot elevation contains four sets of 4160 volt switchgear which provide safe shutdown functions. It also contains the building HVAC supply air fans and the oil bath air intake filters for the emergency diesel generators. All of the switchgear rooms are separated by three-hour rated barriers from adjacent rooms with the exceptions of two equipment hatches which will be upgraded to comply with Appendix R. Due to the low fire loading in each room, no automatic suppression is provided. In the area in which the HVAC fans and air filters are located, localized protection is provided by an automatic AFFF suppression system on each air intake filter. This area, in addition to the standpipe system hose reels provided is also equipped with two AFFF hose reels for manual fire fighting.

D. Service Water Building

The Service Water Building has safe shutdown systems and equipment on two of its three elevations (e.g., 4 foot and 20 foot). Fire detection is provided on both of these elevations and each is provided with manual fire suppression capability including one or more standpipe system hose reels and portable fire extinguishers.

The 4 foot elevation contains safe shutdown control and power cables. These cables are protected by a sprinkler system designed to extinguish exposure fires. Although this area is virtually devoid of combustibles other than the cables, the sprinkler system was designed for moderate fire loading. The installed system, however, is capable of providing

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[3] These trenches drain to an exterior collection basin. Thus, significant accumulation of combustible liquids is precluded.

147% of the designed density 0.19 gpm/$ft^2$; a flow 178% above that required in an area where quantities and combustibility of contents is very high and flammable liquids are present.

The 20 foot elevation contains safe shutdown pumps and motor and control centers and has sprinklers throughout. Although the area contains minimal exposed combustibles, the sprinkler system was designed for areas where quantity and/or combustibility of contents is high and fires with high rates of heat release are expected. The system, as installed, provides 222% of the design density and 192% of the density specified for areas of the severest hazards.