DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

October 21, 1981

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

RECEIVED
OCT 26 1981
U.S. NUCLEAR REGULATORY COMMISSION

Attention: Ms. E. G. Adensam, Chief
Licensing Branch No. 4

Re: McGuire Nulcear Station
Docket Nos. 50-369, 50-370

Dear Mr. Denton:

Attached is Duke Power Company's evaluation of McGuire against the applicable requirements of Appendix R to 10CFR50. Also included are responses to several concerns with the Standby Shutdown Facility which were raised in the September 9, 1981 meeting between the NRC Staff and Duke Power Company representatives. Four copies of each of the above documents, including the associated drawings, are included in this submittal.

Please note that the responses to the SSF questions are based on the design of the SSF as described in my letter of March 30, 1980. This design concept was subsequently reviewed and accepted in Supplement No. 2 to the McGuire Safety Evaluation Report.

Please advise if you have further questions regarding this matter.

Very truly yours,

William O. Parker, Jr.

GAC/smh

Attachment

cc: M. J. Graham
Resident Inspector
McGuire Nuclear Station

Mr. James P. O'Reilly, Director
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

B002 S1/4 Aperture Card Dist.
Drawings To: Reg File - 1 set
PM - 3 sets

8110270299 811021
PDR ADOCK 05000369
F PDR

RESPONSE TO

APPENDIX R

McGUIRE NUCLEAR STATION

SECTION III.G - FIRE PROTECTION OF SAFE SHUTDOWN CAPABILITY

As outlined in our March 1980 submittal of the design description for the McGuire Standby Shutdown Facility, Duke plans to exercise the option of a dedicated shutdown capability referenced in Section III.G.3 of Appendix R. The March 1980 submittal did not address the associated circuits referenced in Section III.G.3 or separation of cables in noninerted containments referenced in Section III.G.2. These are addressed in this attachment.

Associated Circuits

With regard to associated circuits as outlined in Section III.G.3 of Appendix R, Duke has conducted a review of associated circuits at McGuire. The results of this review are provided in the following.

Shutdown capabilities are assured by separating the shutdown divisions by fire barriers outside of the Reactor Building. Circuits which may be associated with the redundant shutdown divisions, have not had the same fire barrier requirements applied.

The subject associated circuits can be divided into two categories as follows:

1. Those circuits considered associated by being electrically connected to a shutdown division's power busses.

2. Those circuits considered associated by proximity by sharing raceways, etc. The first category of associated circuits can be addressed by use of the following "worst case" illustration.

A fire zone was postulated which contained both Division A and Standby Shutdown Facility (SSF) shutdown cables. By the Duke criteria Division B Shutdown cables would not be present in this fire zone. However, the criteria does not prohibit Division B associated cables (which are connected to the Division B power busses) from being present in the subject fire zone. (See Figure 1 for pictorial representation)

For the case of an all consuming fire in the fire zone no degradation of the Division B shutdown division would occur since the associated circuit breaker (or fuse) will operate to clear the fault provided this breaker is coordinated with the bus incoming breaker. This breaker coordination is provided as part of the Duke design.

The second category of associated circuits are those which are routed in the same raceways as shutdown circuits but are not supplied power from the shutdown busses. In this instance the goal is to contain or interrupt the fault current in the associated circuit to prevent it from propagating to a redundant shutdown division cable (see Figure 2). For this case breaker coordination is not a concern since the power source to the associated cable is not from a shutdown division bus.

Interruption of the fault current is accomplished by the breaker feeding the associated circuit. The breaker is adequately sized to protect the cable per standard Duke Power design practice.

Additionally the cable used by Duke Power is of the armored type. Duke has performed tests that demonstrate a fault within a cable will not propagate into an adjacent cable, even if the breaker feeding the faulted cable fails to trip.

Hence as shown above, the presence of associated circuits in a fire zone with a shutdown division will not propagate the effects of a fire in that zone in such a way as to prevent the other shutdown division from performing its intended function.

With installation of the Standby Shutdown Facility (SSF) there will be two independent areas from which a hot standby condition can be achieved and maintained. As indicated in the previous submittal, cabling for these two independent systems are routed through a switchgear room and penetration room to the Reactor Building.

Since cabling for the SSF is routed directly through a switchgear room and penetration room to the Reactor Building and does not interface with any other plant areas, Duke Power Company requests an exemption to Section III.G.3 of the rule which requires that "a fixed fire suppression system... be installed in the... zone under consideration." The zone under consideration, the Control Room, is separated by physical separation and 3-hour fire barriers from the penetration room where redundant SSF cabling enters Auxiliary Building and routes to Reactor Building. Fire detection devices are presently installed in the Control Room. A fixed fire suppression system in the Control Room is not deemed necessary (or desirable) in light of the existing commitment to install the SSF.

A review of routings for circuits inside the Reactor Building necessary for hot standby has been conducted utilizing the criteria in Section III G of Appendix R.

Due to design considerations, the Reactor Building is divided into the annulus and inner containment. For analysis purposes the annulus is being considered part of the containment.

The criteria for review of the cable routings was to provide separation of cables and equipment of redundant shutdown functions by a horizontal distance of more than 20 feet with no intervening combustibles. Since the PVC jacket has been stripped from the armored cable located in the inner containment, the intervening area between cables and equipment of redundant shutdown functions is considered to be devoid of combustibles (note that there are a limited number of cases where the function of the circuits required jacketed cables).

In the annulus area the PVC jacket has been left on the armored cable. This situation will be addressed by upgrading the installed manually actuated sprinkler system to a preaction sprinkler system. The installed detectors will be left in place.

Since a minimum of combustibles exist inside containment during normal operations postulated fires are not expected to spread beyond the area of origin. The following descriptions outline how cables are routed and the amount of cable separation. These descriptions illustrate that hot standby capability will not be compromised due to a fire inside containment. Also included along with these descriptions are drawings which are referenced to show cable routes.

1. Steam Generator Secondary Side Isolation

The Standby Shutdown Facility (SSF) devices 1BB5A and 1BB6A are located on drawing MC-1919-01.01 at coordinates 5-K. The cable associated with these devices is number 1*BB516. This cable continues on drawing MC-1920-01.01 at coordinates 8-D where it is shown to leave inner containment through a penetration. In the annulus, the cable associated with these devices is number 1*BB502. This cable originates at penetration E112 on drawing MC-1921-01.01 at 27° and elevation 754+0 and leaves the annulus at 45° and elevation 754+0.

Alternate devices 1BB1B and 1BB2B are located outside containment. Therefore, a fire will not effect both the SSF and alternate Steam Generator secondary side isolation functions.

The SSF devices 1BB7A and 1BB8A are located on drawing MC-1919-01.01 at coordinates 5-K. The cable associated with these devices is number 1*BB517. This cable continues on drawing MC-1920-01.01 at coordinates 8-D where it is shown to leave inner containment through a penetration. In the annulus, the cable associated with these devices is number 1*BB515. This cable originates at penetration E112 on drawing MC-1921-01.01 at 27° and elevation 754+0, and leaves the annulus at 45° and elevation 754+0.

Alternate devices 1BB3B and 1BB4B are located outside containment. Therefore, a fire will not effect both the SSF and alternate Steam Generator secondary side isolation functions.

2. Power Operated Relief Valve (PORV) (Isolation).

The SSF device 1NC32B is located on drawing MC-1920-01.01 at coordinates 8-H. The cables associated with this device are numbers 1*NC578 and 1*NC580 (one for power and one for control). These cables are shown to leave inner containment at coordinates 8-K. In the annulus, the cable associated with this device is number 1*NC595A. This cable originates at penetration E231 on drawing MC-1921-02.01 at 152° and elevation 758+0, and leaves the annulus at 118° and elevation 743+0.

The alternate device 1NC31B is located on drawing MC-1920-01.01 at coordinates 8-H. The cables associated with this device are numbers 1*NC527, 1*NC634 and 1*NC531 (one for power and two for control). Cable numbers 1*NC527 and 1*NC634 leave inner containment at coordinates 8-K, and cable number 1*NC531 leaves inner containment at coordinates 8-C. In the annulus, the cable associated with this device are 1*NC528, 1*NC636 and 1*NC532. Cable 1*NC528 and 1*NC636 originate at penetration E237 on drawing MC-1921-02.01 at 156° and elevation 758+0 and leave the annulus at 117° and elevation 746+0. Cable number 1*NC532 originates at penetration E108 on drawing MC-1921-01.01 at 25° and elevation758+6 and leaves the annulus at 42° and elevation 764+0.

The SSF device 1NC34A is located on drawing MC-1920-01.01 at coordinates 8-G. The cables associated with this device are numbers 1*NC581 and 1*NC583. These cables are shown to leave inner containment at coordinates 8-C. In the annulus, the cable associated with this device is number

1*NC593. This cable originates at penetration E114 on drawing MC-1921-01.01 at 29° and elevation 759+0, and leaves the annulus at 41° and elevation 765+0.

The alternate device 1NC33A is located on drawing MC-1920-01.01 at coordinates 8-G. The cables associated with this device are numbers 1*NC519, 1*NC633 and 1*NC523. Cable numbers 1*NC519 and 1*NC633 are shown to leave inner containment at coordinates 8-C, and cable number 1*NC523 leaves inner containment at coordinates 8-K. In the annulus, the cables associated with this device are 1*NC520, 1*NC637, and 1*NC524. Cable 1*NC520 originates at penetration E108 on drawing MC-1921-01.01 at 25° and elevation 758+6 and leaves the annulus at 42° and elevation 764+0. Cable 1*NC637 originates at penetration E115 on drawing MC-1921-01.01 at 29° and elevation 754+6 and leaves the annulus at 44° and elevation 754+0. Cable 1*NC524 originates at penetration E237 on drawing MC-1921-02.01 at 156° and elevation 758+0 and leaves the annulus at 117° and elevation 746+0.

The SSF device 1NC36B is located on drawing MC-1920-01.01 at coordinates 8-G. The cables associated with this device are numbers 1*NC584 and 1*NC586. These cables are shown to leave inner containment at coordinates 8-K. In the annulus, the cable associated with this device is 1*NC595A. This cable originates at penetration E231 on drawing MC-1921-02.01 at 152° and elevation 758+0, and leaves the annulus at 118° and elevation 743+0.

The alternate device 1NC35B is located on drawing MC-1920-01.01 at coordinates 8-G. The cables associated with this device are numbers 1*NC513, 1*NC517 and 1*NC632. Cable numbers 1*NC513 and 1*NC632 are shown to leave inner containment at coordinates 8-K, and cable number 1*NC517 leaves inner containment at coordinates 8-C. In the annulus, the cables associated with this device are 1*NC514, 1*NC518 and 1*NC636. Cables 1*NC514 and 1*NC636 originate at penetration E237 on drawing MC-1921-02.01 at 156° and elevation 758+0 and leaves the annulus at 117° and elevation 746+0. Cable number 1*NC518 originates at penetration E108 on drawing MC-1921-01.01 at 25° and elevation 758+6 and leaves the annulus at 42° and elevation 764+0.

As noted, the cables for the PORV SSF devices and the alternates are routed in a common fire area. Many of the SSF isolation functions are initiated because of the low flow capabilities of the Standby Makeup Pump. A fire inside containment will not effect equipment located outside containment where a much larger flow is available from the centrifugal charging pumps and the reciprocating charging pumps. Therefore, these PORV isolation functions are not necessary.

3. Reactor Coolant System Letdown (head vent valves)

The SSF devices 1NC272A, and 1NC273A, are located on drawing MC-1922-01.01 at coordinates 6-H. The cable associated with these devices is number 1*NC968. This cable is shown to leave inner containment at coordinates 2-1. In the annulus, the cable associated with these devices is number 1*NC970. This cable originates at penetration E312 on drawing MC-1921-02.01 at 254° and elevation 800+6 and leaves the annulus at 132° and elevation 760+6.

4. The Reactor Coolant System Isolation (Head Vent Valves)

The SSF devices 1NC274B and 1NC275B are located on drawing MC-1922-01.01 at coordinates 7-1. The cable associated with these devices is number 1*NC973. This cable is shown to leave inner containment at coordinates 2-F. In the annulus, the cable associated with these devices is number 1*NC972. This cable originates at penetration E449 on drawing MC-1921-01.01 at 297°-30' and elevation 823+0 and leaves the annulus at 116° and elevation 746+6.

There is no alternate device for the Reactor Coolant System Letdown or the Reactor Coolant System Isolation SSF device. These SSF isolation functions are initiated because of the low flow capabilities of the Standby Makeup Pump. A fire inside containment will not effect equipment located outside containment where a much larger flow is available from the centrifugal charging pumps and the reciprocating charging pumps. Therefore, these RCS letdown and RCS isolation functions are not necessary.

5. Pressurizer Spray Isolation

The SSF device 1NC27 is located on drawing MC-1920-01.01 at coordinates 8-F. The cable associated with this device is number 1NC975. This cable is shown to leave inner containment at coordinates 9-E. In the annulus, the cable associated with this device is number 1NC974. This cable originates at penetration E125 on drawing MC-1921-01.01 at 62° and elevation 760+6 and leaves the annulus at 62° and elevation 758+6.

The SSF device 1NC29 is located on drawing MC-1920-01.01 at coordinates 8-G. The cable associated with this device is number 1NC976. This cable is shown to leave inner containment at coordinates 9-E. In the annulus, the cable associated with this device is number 1NC974. The cable routing was previously discussed.

There is no alternate device for either of the Pressurizer Spray Isolation devices. If these valves cannot be closed then the corresponding Reactor Coolant Pump will be tripped.

6. Residual Heat Removal System Isolation

The SSF device 1ND2A is located on drawing MC-1920-01.01 at coordinates 6-J. The cables associated with this device are numbers 1*ND538 and 1*ND539. Cable number 1*ND538 is shown on drawing MC-1919-01.01 and continues on drawing MC-1920-01.01 where it leaves inner containment at coordinates 8-C. Cable number 1*ND539 is shown on drawing MC-1920-01.01 and leaves inner containment at coordinates 8-C. In the annulus, the cables associated with this device are numbers 1*ND586 and 1*ND543. Cable number 1*ND586 originates at penetration E108 on drawing MC-1921-01.01 at 25° and elevation 758+6 and leaves the annulus at 41° and elevation 765+0. Cable number 1*ND543 originates at penetration E106 on drawing MC-1921-01.01 at 22° and elevation 755+0 and leaves the annulus at 45° and elevation 754+0.

The alternate device 1ND1B is located on drawing MC-1920-01.01 at coordinates 6-H. The cables associated with this device are numbers 1*ND534 and

1*ND535. Cable number 1*ND534 is shown on drawing MC-1920-01.01 and leaves inner containment at coordinates 8-K. Cable number 1*ND535 is shown on drawing MC-1919-01.01 and continues to drawing MC-1920-01.01 where it leaves inner containment at coordinates 8-K. In the annulus, the cables associated with this device are numbers 1*ND549 and 1*ND548. Cable number 1*ND549 originates at penetration E231 on drawing MC-1921-02.01 at 152° and elevation 758+0 and leaves the annulus at 117° and elevation 743+0. Cable number 1*ND548 originates at penetration E251 on drawing MC-1921-02.01 at 162° and elevation 759+0 and leaves the annulus at 117° and elevation 746+0.

As noted, the cables for the Residual Heat Removal System isolation SSF devices and the alternates are routed in a common fire area. Therefore, no credit can be given for availability of either device in the event of a fire . In order to ensure this function can be performed properly, the control cable serving the SSF device 1ND2A will be divided into two cables so that no internal short can cause the valves to open.

7. Nuclear Sampling System Isolation

The SSF device 1NM25A is located on drawing MC-1920-01.01 at coordinates 6-F. The cable associated with this device is number 1*NM560. This cable is shown to leave inner containment at coordinates 8-C. In the annulus, the cable associated with this device is 1*NM557. This cable originates at penetration E112 on drawing MC-1921-01.01 at 27°-30' and elevation 754+0, and leaves the annulus at 45° and elevation 754+0.

The alternate device 1NM26B is located outside of containment. Therefore a fire will not effect both the SSF and alternate Nuclear Sampling System isolation functions.

The SSF device 1NM22A is located on drawing MC-1920-01.01 at coordinates 7-F The cable associated with this device is number 1*NM562. This cable is shown to leave inner containment at coordinates 8-C. In the annulus, the cable associated with this device is 1*NM557. The cable routing was previously discussed.

The alternate device 1NM26B is located outside of containment, Therefore, a fire will not effect both the SSF and alternate Nuclear Sampling System isolation functions.

The SSF device 1NM3A is located on drawing MC-1919-01.01 at coordinates 8-1. The cable associated with this device is number 1*NM565. This cable continues on drawing MC-1920-01.01 at coordinates 7-D and is shown to leave inner containment at coordinates 8-C. In the annulus, the cable associated with this device is number 1*NM563. This cable originates at penetration E111 on drawing MC-1921-01.01 at 27°-30' and elevation 758+6 and leaves the annulus ate 41° and elevation 76[illegible]+0.

The alternate device 1NM7B is located outside of containment. Therefore, a fire will not effect both the SSF and alternate Nuclear Sampling System isolation functions.

The SSF device 1NM6A is located on drawing MC-1919-01.01 at coordinates

8-I. The cable associated with this device is number 1*NM566. This cable continues on drawing MC-1920-01.01 at coordinates 7-D and is shown to leave inner containment at coordinates 8-C. In the annulus, the cable associated with this device is number 1*NM563. The cable routing was previously discussed.

The alternate device 1NM7B is located outside of containment. Therefore, a fire will not effect both the SSF and alternate Nuclear Sampling System isolation functions.

8. Normal Reactor Coolant Pump Seal Water Return Isolation

The SSF device 1NV94A is located on drawing MC-1919-01.01 at coordinates 6-K. The cable associated with this device is number 1*NV512. This cable continues on drawing MC-1920-01.01 at coordinates 7-D and is shown to leave inner containment at coordinates 8-C. In the annulus, the cable associated with this device is number 1*NV511. This cable originates at penetration E108 on drawing MC-1921-01.01 at 25° and elevation 758+6, and leaves the annulus at 41° and elevation 764+0.

There is no alternate device for the Reactor Coolant Pump Seal Water Return Isolation valve. This function is initiated because of the low flow capabilities of the Standby Makeup Pump. A fire inside containment will not effect equipment located outside containment where a much larger flow is available from the centrifugal charging pumps and the reciprocating charging pumps. Therefore, this reactor coolant pump seal water return isolation function is not necessary.

9. Chemical Volume Control System (CVCS)/Reactor Coolant System (RCS) Isolation

The SSF device 1NV24B is located on drawing MC-1920-01.01 at coordinates 5-H. The cable associated with this device is number 1*NV546. This cable is shown to leave inner containment at coordinates 8-K. In the annulus, the cable associated with this device is number 1*NV545. This cable originates at penetration E238 on drawing MC-1921-02.01 at 155° and elevation 754+6 and leaves the annulus at 117° and elevation 743+0.

The SSF device 1NV25B is located on drawing MC-1919-01.01 at coordinates 3-J. The cable associated with this device is number 1*NV547. This cable is shown to continue on drawing MC-1920-01.01 where it leaves inner containment at coordinates 8-K. In the annulus; the cable associated with this device is number 1*NV545. The cable routing was previously discussed. Both SSF devices 1NV24B and 1NV25B could act as alternates to each other if not for the closeness of their cable routings. These SSF isolation functions are initiated because of the low flow capabilities of the Standby Makeup Pump. A fire inside containment will not effect equipment located outside containment where a much larger flow is available from the centrifugal charging pumps and the reciprocating charging pumps. Therefore, these CVCS/RCS isolation functions are not necessary.

The SSF device 1NV1A is located on drawing MC-1920-01.01 at coordinates 4-H. The cable associated with this device is number 1*NV692. This cable is shown to leave inner containment at coordinate 8-C. In the annulus, the cable associated with this device is number 1*NV690. This cable originates at penetration E111 on drawing MC-1921-01.01 at 27°-30' and elevation 758+6 and leaves the annulus at 41° and elevation 765+0.

The alternate device 1NV7B is located outside containment. Therefore, a fire will not effect both the SSF and alternate CVCS/RCS functions.

10. Standby Make-up Pump Test Valve

The SSF device 1NV1012C is located on drawing MC-1920-01.01 at coordinates 3-I. The cables associated with this device are numbers 1NV816 and 1NV818. Cable number 1NV816 is shown to leave inner containment at coordinates 8-J. Cable number 1NV818 is shown to leave inner containment at coordinates 8-D. In the annulus, the cables associated with this device are numbers 1NV813 and 1NV814. Cable 1NV813 originates at penetration E227 on drawing MC-1921-02.01 at 144° and elevation 751+0, and leaves the annulus at 137° and elevation 747+0. Cable 1NV814 originates at penetration E117 on drawing MC-1921-01.01 at 36° and elevation 758+6 and leaves the annulus at 44° and elevation 747+0.

11. Standby Make-up Pump Isolation Valve

The SSF device 1NV1013C is located on drawing MC-1920-01.01 at coordinates 3-I. The cables associated with this device are numbers 1NV817 and 1NV819. Cable number 1NV817 is shown to leave inner containment at coordinates 8-J. Cable number 1NV819 is shown to leave inner containment at coordinates 8-D. In the annulus, the cables associated with this device are numbers 1NV815 and 1NV814. Cable 1NV815 originates at penetration E227 on drawing MC-1921-02.01 at 144° and elevation 751+0 and leaves the annulus at 137° and elevation 747+0. Cable routing for 1NV814 was previously discussed.

There is no alternate device for the standby makeup pump test valve or isolation valve. These functions are initiated because of the low flow capabilities of the Standby Makeup Pump. A fire inside containment will not effect equipment outside containment where a much larger flow is available from the centrifugal charging pumps and the reciprocating charging pumps. Therefore, these standby makeup pump test valve and isolation valve functions are not necessary.

12. Temperature Monitoring

This SSF function is performed by three incore thermocouples noted on drawing MC-1920-01.01. The first thermocouple is noted at coordinates 9-E. The cable associated with this device is number 1ENA628. This cable is shown to leave inner containment at coordinates 9-I. In the annulus the cable associated with this device is 1NC962. This cable originates at penetration E268 on drawing MC-1921-02.01 at 117° and elevation 762+0 and leaves the annulus at 120° and elevation 764+0.

The second thermocouple is noted at coordinates 9-E. The cable associated with this device is number 1ENA 633. This cable is shown to leave inner containment at coordinates 2-E. In the annulus, the cable associated with this device is 1NC963. This cable originates at penetration E425 on drawing MC-1921-01.01 at 301° and elevation 755+0, and leaves the annulus at 54° and elevation 762+0.

The third thermocouple is noted at coordinates 8-E. The cable associated with this device is number 1ENA758. This cable is shown to leave inner containment at coordinates 2-E. In the annulus, the cable associated with this device is 1NC964. This cable originates at penetration E425 on drawing MC-1921-01.01 at 301° and elevation 755+0 and leaves the annulus at 72°-30' and elevation 748+0.

In order to receive a true reading from the above mentioned incore thermocouples, a reference resistive thermal device (RTD) is required. This RTD is noted at coordinates 9-E on drawing MC-1920-01.0'. The cable associated with this device is number 1ENA775. This c le is shown to leave inner containment at coordinates 8-J. In the annulus, the cable associated with this device is 1ENA774. This cable originates at penetration E222 on drawing MC-1921-02.01 at 141° and elevation 763+0 and leaves the annulus at 138° and elevation 760+6.

An alternate for the incore thermocouples is a hot-leg, cold-leg RTD pair from one loop. However, the cable routes of the RTD coincide with the incore thermocouples and cannot be relied upon. The incore thermocouples will be separated by a minimum of twenty feet.

13. Pressurizer Heater

This SSF device is noted on drawing MC-1920-01.01 at coordinate 8-H. The cable associated with this device is number 1ILE614. This cable is shown to leave inner containment at coordinates 10-G. In the annulus, the cable associated with this device is number 1ILE613. This cable originates at penetration E205 on drawing MC-1921-02.01 at 94° and elevation 748+0 and leaves the annulus at 92° and elevation 747+0. There is no alternate device for the pressurizer heater. It has been determined that it is possible to perform the necessary shutdown function without the use of the pressurizer heater.

Cable routings previously outlined are for Unit 1. Detailed routings for Unit 2 may be slightly different, however, the logic concerning effects on shutdown will be the same : should also be noted that the cable routings as described are resent day arrangement. Future modifications will be reviewed to comply .n criteria outlined in Appendix R Section III.

RESPONSE TO SECTION J OF APPENDIX R - EMERGENCY LIGHTING

Emergency lighting in areas needed for operation of safe shutdown equipment and in access and egress routes thereto is addressed in the McGuire Nuclear Station Fire Protection Review dated September 1977 and revised January 1979. This commitment meets the intent of Appendix R.

SECTION III.L ALTERNATIVE AND DEDICATED SHUTDOWN CAPABILITY

In March, 1980 a design description of the Standby Shutdown System was submitted to the NRC. This submittal addresses in detail the items listed in Section III.L except availability of power for cold shutdown equipment and instrumentation. An independent on site power system is supplied to support Standby Shutdown System equipment and instrumentation required to achieve and maintain a hot standby condition for one or both units. In addition, cold shutdown can be achieved using either the existing 1E power systems or the off site power system, as appropriate. It is not necessary to power cold shutdown equipment and instrumentation from both the on site and off site power systems to accommodate fire damage.

Based on the March, 1980 submittal and the clarification of power supply availability, we conclude that the intent of this section has been met.

RESPONSE TO SECTION O OF APPENDIX R - OIL COLLECTION SYSTEM FOR REACTOR COOLANT PUMP

The Reactor Coolant Pump Motor Oil Collection System is being analyzed to determine what hardware changes will be required to provide reasonable assurance that the system will withstand the Safe Shutdown Earthquake.

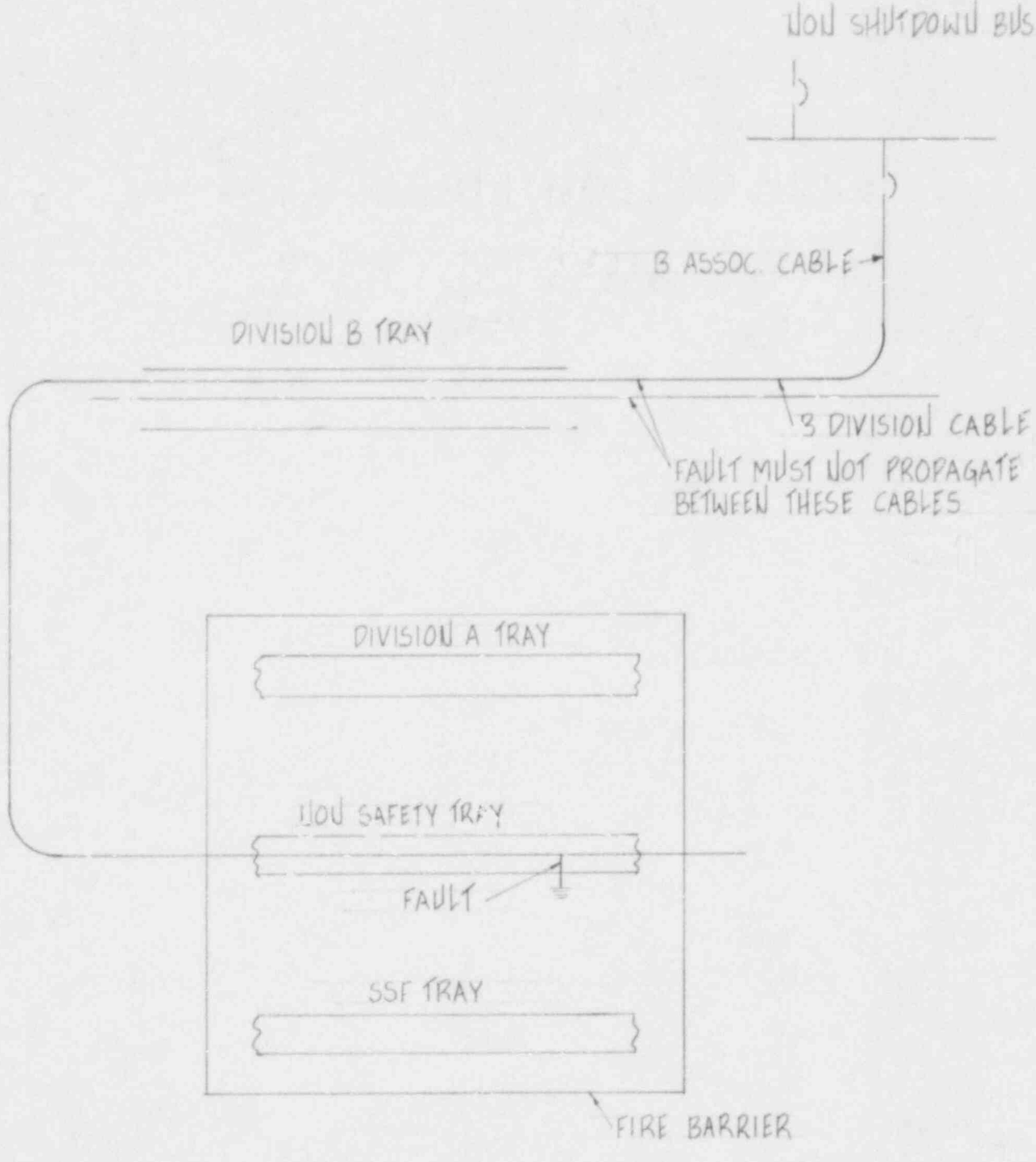
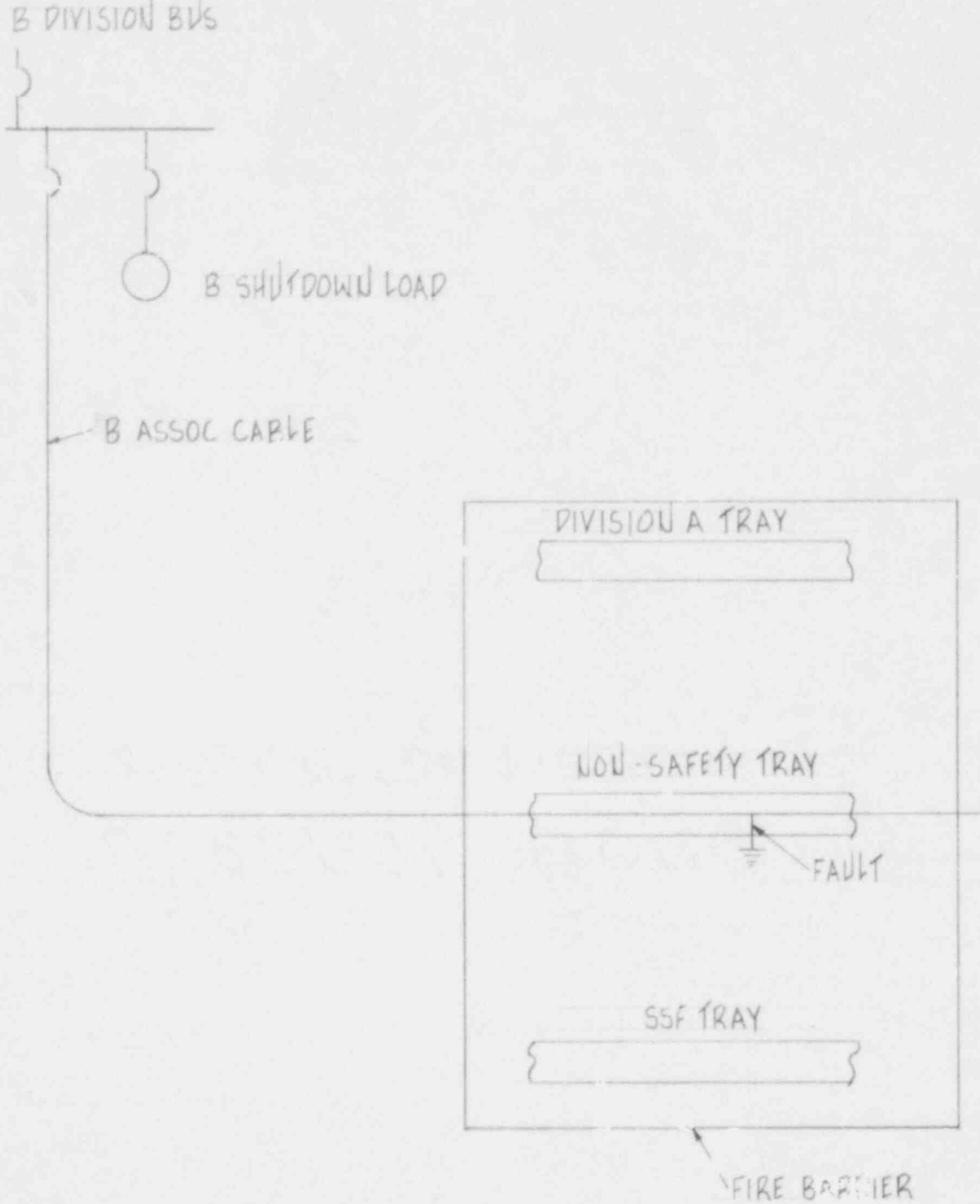

NON SHUTDOWN BUS
B ASSOC. CABLE
DIVISION B TRAY
B DIVISION CABLE
FAULT MUST NOT PROPAGATE BETWEEN THESE CABLES
DIVISION A TRAY
NON SAFETY TRAY
FAULT
SSF TRAY
FIRE BARRIER

FIGURE 2



B DIVISION BUS
B SHUTDOWN LOAD
B ASSOC CABLE
DIVISION A TRAY
NON-SAFETY TRAY
FAULT
SSF TRAY
FIRE BARRIER

FIGURE 1

RESPONSE TO ENCLOSURE 2 OF SEPTEMBER 9, 1981 MEETING WITH NRC CONCERNING THE

STANDBY SHUTDOWN SYSTEM

1. Standby Shutdown System Separation

As part of the review to show compliance of the McGuire facility with Appendix R, the licensee should provide the following specific information:

a) Verification that a fire which incapacitates normal shutdown systems will not also cause spurious operation of the valve connecting the standby makeup pump discharge to the containment sump (valve 1NV1012C).

Response:
The referenced valve located in the Reactor Building is used for performance testing and will have power removed during normal plant operation. Also, note that at least one normal plant train is separated by fire barriers from the Standby Shutdown train to preclude involvement of all shutdown trains in any one fire. The details of this separation are discussed in Appendix C of the McGuire Nuclear Station Fire Protection Review dated January 1979.

b) Verification that cables for redundant pressurizer power operated relief valves are adequately separated from each other and normal shutdown system cables.

Response:
The design bases for the SSF includes ten minutes for manual initiation of required systems. Power and control for the PORV solenoids could be manually removed within this period to preclude subsequent spurious operation.

c) Verification that fire damage will not cause spurious operation of auxiliary feedwater system valves such that:

1) both steam admission valves to the auxiliary feedwater pump turbine are shut, or

2) auxiliary feedwater flow to the steam generators is blocked or reduced below an acceptable level.

Response:
Separation has been assured for the auxiliary feedwater system such that auxiliary feedwater will be available either from the turbine driven pump or the motor driven pumps during and after the loss of equipment and cabling in any one fire zone. If a fire prevents operation of both steam admission valves to the turbine driven pump, the motor driven pumps will be available to provide auxiliary feedwater. The motor operated isolation valves (which are normally kept in the open position) are physically separated in the two Unit doghouses, such that auxiliary feedwater flow can be assured to two steam generators.

d) Verification that adequate separation is provided between the cables for the pressurizer heaters powered from the standby shutdown power system and cables for normal shutdown equipment.

Response:

If the pressurizer is incapacitated by a localized fire in the Reactor Building, the unit will be brought down to a cold shutdown condition since the necessary equipment for accomplishing this is located outside the affected area of the fire.

2. Manual Operator Actions

The licensee, in the submittal of March 31, 1980 has indicated that manual operator action is required to actuate the standby shutdown system. Many of the operator actions required to achieve and maintain hot standby conditions can be accomplished in the standby shutdown facility. However, it is not clear that all valve operations and instrumentation monitoring can be accomplished in the standby shutdown facility control room. Areas of concern include valve lineup for the source of water to the standby makeup pump, operation of auxiliary feedwater flow control valves, monitoring of auxiliary feedwater flow rate, and monitoring of standby makeup filter differential pressure. The manpower availability to perform the required manual operations has not been verified. The licensee should provide the following information:

a) Verification that sufficient manpower will be available on-site to perform the required manual operations in a timely manner to achieve and maintain safe hot standby conditions in both reactor units. Manpower availability should consider the minimum shift crew exclusive of fire brigade members.

Response:

There will be sufficient manpower on-site to achieve the hot standby condition for both reactor units. The detailed station operating procedures are under development; therefore, specific manpower requirements are not available at the present time; however, it is expected that the normal shift complement will be adequate to achieve and maintain hot standby utilizing the Standby Shutdown Facility.

b) Verification that access to local operation and monitoring stations will be available for a fire in any plant area necessitating use of the Standby Shutdown Facility.

Response:

The only local operation station which requires immediate access is the turbine driven auxiliary feedwater pump room. In order to reach this room, an operator would pass through the motor driven auxiliary feedwater pump room (the turbine driven and motor driven pump rooms are separated by a 3 hr. fire barrier). A fire in the motor driven pump room could possibly delay operator action to throttle feedwater to individual Steam Generators. However, an alternate method of Steam Generator level control can be accomplished by throttling the steam supply to the turbine driven pump utilizing a valve located in the dog house area which would be unaffected by a fire in the motor driven pump room.

c) Verification that all operators will be trained in the use of the standby shutdown systems.

Response:

Operators will be trained in the use of the standby shutdown system. Specific station procedures are presently being developed.

3. Standby Makeup Pump

A standby shutdown system makeup pump is provided in the containment annulus for each unit. These positive displacement pumps provide a constant flow of 26 gpm per pump - 18 gpm for seal leakage and 8 gpm for reactor coolant system makeup and boration. The licensee should provide the following information about the standby makeup pumps:

a) Verification that the pump is qualified for continuous operation in the annulus environment resulting from a loss of containment/annulus cooling and ventilation. The ambient temperature resulting from a fire should be considered in this analysis if a containment/annulus fire would necessitate use of the standby shutdown system.

Response:

The standby makeup pump and motor are qualified for the appropriate environmental conditions (Reactor Building environment after loss of HVAC). For a fire in the Reactor Building the makeup pump is not required. The makeup pump is only required for a fire outside the Reactor Building which disables the normal shutdown systems.

b) Verification that the 8 gpm available for makeup and boration will increase the boron concentration of the reactor coolant system adequately to counteract the effects of xenon decay at hot standby and permit cooldown to safe cold shutdown conditions for all times in the cycle.

Response:

For hot standby conditions, the boration (2000 ppm) obtained from the 8 gpm makeup in addition to inserted control rods is adequate to prevent any positive reactivity excursions while at hot standby. Before going to cold shutdown, normal shutdown systems will be reinstated.

4. Reactor Coolant Makeup Source

The standby shutdown system uses the spent fuel pool as the source of borated water for makeup to the reactor coolant system. The spent fuel pool is aligned to the suction of the standby makeup pump via a line connected to the fuel transfer tube. There is not sufficient information in the FSAR and licensee submittal of March 31, 1980 to evaluate the adequacy of this source of makeup water. The licensee should provide the following information.

a) Drawings showing the entire flow path from spent fuel pool to suction of the standby makeup pump.

Response:

The following drawings (copies attached) identify the entire flow path for the standby makeup pump from the spent fuel pool to the makeup pump suction and to the RCP seals.

MC-1554-1.3
MC-1554-1.0
MC-1554-1.1

b) A listing of the valves in this flow path with a discussion of the method of valve control and a verification that adequate manpower and time will be available to line up the flow path.

Response:

Listed are motor operated valves in the makeup pump flow path, method of control, and time required to initiate the function after determining SSF operation is necessary.

	Valve Control		
Valve No.	Main Control Room	SSF Control Room	Initial Time Required
1NV842A, C	Yes	Yes	After 10 mins.
1NV849A, C	Yes	Yes	After 10 mins.
1NV1012C	No	Yes	Testing only
1NV1013C	No	Yes	After 10 mins.
1NV94A, C	Yes	Yes	After 10 mins.

Adequate manpower and time will be available to line up the makeup pump flow path since this will be accomplished by the operator from the SSF control room.

c) A description of the source of makeup water and boric acid to the spent fuel pools and a verification that this makeup can be initiated in time to maintain a water level in the pools at least 10 feet above the active fuel region of the stored spent fuel.

Response:

With a maximum of 26 gpm draw down rate there is sufficient time to maintain at least 10 feet of water above the fuel assemblies. Operators will provide makeup as required. For long term, makeup supply sources are available from Reactor Makeup Water Storage Tank or Refueling Water Storage Tank (both borated to 2000 ppm).

d) A discussion of the consequences of loss of fuel storage area HVAC and air filtration along with the loss of the spent fuel pool cooling system and draw-down of the spent fuel pool water level and possible fuel pool boiling. Verify that technical specification limits for airborne radiation will not be exceeded.

Response:

Analysis shows that the releases are well within 10CFR100 limits as a consequence of the referenced scenario.

5. Reactor Coolant System Letdown

Reactor coolant system letdown will be accomplished from the standby shutdown facility by opening pressurizer power operated relief valves. These valves are air-operated valves with an emergency air supply from the blackout air supply header and control power from the standby shutdown diesel generator. There is not sufficient information available to evaluate the adequacy of this letdown path. The licensee should provide the following information:

a) The results of analysis to determine the amount of reactor coolant system letdown required to achieve adequate boron concentration in the reactor coolant system.

Response:

It should be noted that the Pressurizer PORV's will not be utilized for letdown. The Reactor Head Vent System valves (electric solenoids) will be used. The 2000 ppm boron concentration makeup to the RCS will be adequate to maintain hot standby conditions. Letdown will be used to maintain pressurizer level. Cool down will not be accomplished until normal shutdown systems are available.

b) Verification that an adequate air supply will be available in the blackout air supply header to support power operated relief valve operation, for the extended time and number of openings necessary.

Response:

Blackout air is not required. Reference the response to 5a for details.

c) Verification that the relief valve block valves are powered from the standby power system and can be operated from the SSF control station in the event that a pressurizer PORV sticks open.

Response:

Standby system power and control of the pressurizer relief block valves, which backup the PORV's is not required since the single failure criteria is not a design basis for the SSF. Power and control for the PORV solenoids will be removed to assure that these valves remain closed.

6. Standby Makeup Filter

A filter is provided downstream of the standby makeup pump to collect particulate matter larger than 5 microns that could be harmful to the reactor coolant pump seal faces. In a letter dated March 31, 1980, the licensee states that filter fouling is not a problem because the spent fuel pool water is filtered to 3 microns. However, fire damage and loss of offsite power could incapacitate the spent fuel pool cooling and cleanup system. The licensee should verify that adequate standby makeup flow will be maintained in the event of filter fouling if non-filtered water is used for spent fuel pool makeup as the spent fuel water is depleted by the reactor makeup operation.

Response:

Any long term makeup to spent fuel pool will be accomplished with reactor grade water and since the makeup pump filter is sized for 3 times normal pump capacity, the 5 micron filter will be adequate to protect the RCP seals. Also there is access to the filter which is located in the annulus. It should be noted that a fire in the spent fuel area would not require the use of the SSF.

7. Secondary Side Volume Control

The existing turbine-driven auxiliary feedwater pump will be used for secondary side makeup as part of the standby shutdown system. In the letter dated March 31, 1980, the licensee stated that the water in the embedded condenser circulating water pipe will be utilized for secondary side makeup water to maintain hot standby for at least 3 1/2 days. There is not sufficient information available to evaluate the adequacy of the turbine-driven auxiliary feedwater pump and its water source when used as part of the standby shutdown system. The licensee should provide the following information:

a) Details of blackout air facility design - Verification that an adequate emergency air supply will be available to control the air-operated auxiliary feedwater flow discharge valves to maintain hot standby conditions and achieve cold shutdown.

Response:

The auxiliary feedwater flow control valves will be throttled manually. Alternatively, the turbine driven auxiliary feedwater pump governor or the steam supply valve to the turbine driven pump may be utilized to control feedwater flow to the steam generators.

b) Verification that the turbine-driven auxiliary feedwater pump can operate indefinitely with only standby shutdown facility power available to the pump support systems (e.g., lubrication, lube oil cooling, pump room HVAC).

Response:

The turbine-driven auxiliary feedwater pump has been qualified environmentally for loss of pump room HVAC. Pump lube oil coolers receive cooling water from pump suction supply.

c) A description of the provisions that assure a dedicated volume of water supply to the auxiliary feedwater pump.

Response:

An adequate source of water supply to the auxiliary feedwater pump is provided by the embedded main condenser circulating (cooling) water pipe. The large piping system buried under the bottom floor of the turbine building serves as a reservoir for feedwater. Two direct current motor operated valves open automatically on low pump suction pressure to provide a suction supply.

8. Reactor Coolant System Pressure Control

In a letter dated March 31, 1980, the licensee stated that one sub-bank of pressurizer heaters will be powered from the standby shutdown diesel to provide 70 KW of heat to the pressurizer liquid. The licensee further indicated that these heaters may be necessary after 15 hours of hot standby to maintain a steam bubble in the pressurizer. The licensee should provide the following additional information:

a) The results of an analysis verifying the adequacy of 70 KW of heat input in maintaining a steam bubble in the pressurizer and the postulated conditions for which pressurizer heaters would be required.

Response:
The 70 KW heat input to maintain a steam bubble in the pressurizer after 15 hours resulted from calculation of requirements to makeup heat losses. For conservatism, calculations assumed normal heat losses. With loss of HVAC, pressurizer heat loss is much slower; therefore, heaters are not required until after 50 hours at hot standby conditions.

b) Verification that the pressurizer heater sub-bank can be controlled from the SSF shutdown panel.

Response:
The pressurizer heater sub-bank can be controlled from the Standby Shutdown Facility control panel.

9. Decay Heat Removal

Reactor decay heat is removed via natural circulation of the primary side and discharge of steam from the main steam safety valves. This procedure will maintain hot standby conditions in the reactor but will not permit cooldown to cold shutdown conditions. The licensee should verify that cold shutdown conditions can be achieved without offsite power available and within 72 hours of the initiating event for a fire in any plant area.

Response:
The general damage control measures required to permit cooldown to cold shutdown condition within 72 hours have been reviewed with the conclusion that the condition can be achieved. The availability of replacement cable and replacement motors on critical cold shutdown equipment has been a consideration in developing this conclusion. Also it is considered acceptable to achieve cold shutdown using either the existing IE power systems or the offsite power systems as appropriate to accommodate fire damage.

Also, it should be noted that the period for remaining at hot standby can be extended by providing additional reactor grade water to the spent fuel pool.

10. Instrumentation

Some of the instrumentation needed to maintain safe standby conditions are powered from the standby shutdown power system and signal readout is provided in the SSF. The licensee should provide the following additional information:

a) Justification for the lack of dedicated instrumentation for the following variables:

1) Steam generator pressure

2) Auxiliary feedwater flow rate to each steam generator

3) Source range neutron flux.

4) Cold leg or average reactor coolant temperature.

Response:
The dedicated instrumentation provided in the Standby Shutdown Facility is considered a minimum but sufficient to maintain hot standby conditions. A discussion concerning the referenced instrumentation is as follows:

1) Steam generator pressure is not a control parameter (i.e. the operator does not take action or attempt to control based on this information only). Steam Generator level will be used to control Auxiliary feedwater flow.

2) Auxiliary feedwater flow rate to each steam generator affects the level only. SG level provides adequate information and will be used to control flow rate.

3) Source range neutron flux is only required where there is a potential for positive reactivity addition. The following reasons constitute why Duke does not consider this instrumentation to be required:

a) Plant is to be held at hot standby.

b) Control rods are inserted.

c) RCS makeup and boration (2000 ppm) is with fuel pool water.

4) Incore thermocouples with readouts at the SSF provide an indication of decay heat removal from the core. Therefore, cold leg or average temperature instrumentation is not required.

b) Verification of adequate separation between normal power and signal cables and emergency power and signal cables for the incore thermocouples.

Response:
There will be adequate separation between signal cables for the incore thermocouples as outlined in Duke's response to Appendix R Section III G.

c) A description of the local monitoring station for the standby makeup filter differential pressure; verification of access to this station and a statement regarding frequency of monitoring of this gage during emergency operation of the SSF.

Response:

The monitoring station located in the annulus is accessible during SSF operation. These parameters will be monitored as required.

11. System Testing

In the letter of March 31, 1981, the licensee stated that components of the Standby Shutdown System would be tested. The licensee should provide details of the inspection and testing program proposed for the pumps, valves, instrumentation and power supplies of the standby shutdown system.

Response:

Most of the valves utilized during SSF operation are already included in the valve testing program for IWV of Section XI of the ASME code. The valves which were added (i.e. motor-operated valves in the makeup flow path) will be included in this same testing program. The makeup pump will be added to the pump testing program per IWP of Section XI.

Periodic testing of the electrical components will be accomplished to assure readiness of this equipment, i.e. diesel generator will be run, power supplies energized, etc.