Attachment 3

BTP CMEB 9.5-1 FIRE EVENT SAFE SHUTDOWN EVALUATION

CONTROL ROOM FIRE

ALTERNATE SHUTDOWN EVALUATION

(SPURIOUS ACTUATION STUDY)

REVISION 4

FOR THE

VOGTLE ELECTRIC GENERATING PLANT

UNITS 1 & 2

JUNE 1, 1988

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1.0 INTRODUCTION

1.1 SCOPE

The scope of this effort is to evaluate the impact of fire induced hot shorts, shorts to ground and opens in the control room electrical circuitry on the ability to safely shut down the plant from outside the control room both with and without offsite power.

1.2 OBJECTIVE

The objective of this evaluation is to define any necessary special operating procedural requirements and/or design changes required to ensure safe shutdown capability within specific operational time constraints in the event of a control room fire.

2.0 SUMMARY

Fire induced hot shorts, shorts to ground, and opens in the control room electrical circuitry may result in the spurious actuation or inaction of components which could impact the capability to achieve safe (cold) shutdown. To assess the extent of the scenario, each of the fire event safe shutdown systems (Table 2-1) has been evaluated on a component-by-component basis (see Section 5). The compensatory measures required to preclude undesirable occurrences are presented in Section 3.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Section 3.1 details the general operational considerations which must be observed in the event of a control room fire. The remaining sections will present the results of the review of the specific systems, including:

- Evaluation Findings

  The potential undesirable spurious control actions/inactions of the as-built systems are summarized.

- Key Monitorable Parameters (functional)

  Those available parameters which enable the operator to identify the spurious component action/inactions are listed. These parameters are electrically and physically independent of the control room fire.

TABLE 2-1

FIRE EVENT SAFE SHUTDOWN SYSTEMS

- Reactor Coolant
- Chemical and Volume Control
- Safety Injection
- Residual Heat Removal
- Containment Spray
- Nuclear Service Cooling Water
- Component Cooling Water
- Nuclear Sampling-Liquid
- Main Steam
- Auxiliary Feedwater
- Main Feedwater
- Diesel Generator Fuel Oil, and Air Start
- Control Building - Control Room HVAC
- Control Building Safety Features Electrical Equipment Room HVAC
- Control Building Cable Spreading Room HVAC
- Diesel Generator Building HVAC
- Essential Chilled Water
- Auxiliary Feedwater Pumphouse HVAC
- Engineered Safety Features Room Coolers
- 4160 VAC, Class 1E, Electrical Distribution
- 480 VAC, Class 1E, Electrical Distribution
- 125 VDC, Class 1E, Electrical Distribution
- 120 VAC, Class 1E, Electrical Distribution
- Class 1E Diesel Generators (Standby Power)

- Time Constraints

  Critical time constraints for system or component operation are quantified. These time constraints conservatively assume the effects of the fire to be instantaneous. In reality, a control room fire will be slow to develop and detected early. Therefore, these quantified times, i.e. 10 seconds, for action do not mean action can't be taken, only that the action should be taken as soon as possible.

- Operational Considerations

  The basis for operator action(s) required to prevent or mitigate the adverse effects of the spurious control action/inactions, summarized ; the evaluation findings, is detailed.

- Compensatory Measures

  The measures recommended to accomplish each of the operational considerations is presented. These compensatory measures should be included in the plant operating procedures as applicable.

3.1 GENERAL OPERATIONAL CONSIDERATIONS

1. In the event of a control room fire, transfer switches must be operated and the plant aligned to the desired configuration from the remote shutdown panels and other local control stations in order to prevent a control room spurious actuation undetected system realignment. NOTE: Once a transfer switch is operated, automatic control functions will not occur (e.g., load sequencing will not occur).

2. In the event of a control room fire, control the plant shutdown from the Train B remote shutdown panel. (See the Bases for Assumptions 11 and 14 in Section 4.2.)

3.2 REACTOR COOLANT SYSTEM

A. Evaluation Findings

1. With offsite power available (i.e., RCPs operating), a pressurizer spray valve (PV-0455B or PV-0455C) can spuriously open, resulting in uncontrolled RCS depressurization.

2. A pressurizer PORV (PV-0455A or PV-0456A) can spuriously open, resulting in uncontrolled RCS depressurization and loss of RCS inventory.

3. Fire damage to pressurizer pressure transmitter channel for PT-0455/PT-0457 can cause simultaneous opening of the pressurizer spray valves (PV-0455B and PV-0455C) and pressurizer PORV PV-0455A, resulting in uncontrolled RCS depressurization and loss of RCS inventory.

4. The pressurizer auxiliary spray valve (HV-8145) can spuriously open, resulting in uncontrolled RCS depressurization while a charging pump is operating.

B. Key Monitorable Parameters (functional)

1. RCS pressure

2. RCS pressure and pressurizer level

3. RCS pressure and pressurizer level

4. RCS pressure

C. Time Constraints

1. The reactor coolant system may depressurize to the Safety Injection Actuation (SIA) set point in less than 4 minutes in the event one pressurizer spray valve opens.

2. The reactor coolant system may depressurize to the SIA set point in less than 1 minute if one pressurizer PORV opens.

3. The reactor coolant system may depressurize to the SIA set point in approximately 47 seconds if simultaneous opening of both spray valves and 1 PORV occurs (fire damage to PT-0455 or PT-0457 circuits).

4. The reactor coolant system may depressurize to the SIA set point in approximately 3.5 minutes if the auxiliary spray valve opens.

D. Operational Considerations

1. RCS pressure control is necessary to ensure adequate subcooling margin.

2. RCS pressure control is necessary to ensure adequate subcooling margin, and RCS inventory control is necessary to ensure maintaining the core covered.

3. RCS pressure control is necessary to ensure adequate subcooling margin, and RCS inventory control is necessary to ensure maintaining the core covered.

4. RCS pressure control is necessary to ensure adequate subcooling margin.

E. Compensatory Measures

1, 2, 3.

To reduce the potential for uncontrolled RCS depressurization and loss of inventory, prior to establishing plant control at the remote shutdown panels, both PORV block valves should be closed and the Reactor Coolant Pumps (RCPs) for loops 1 and 4 should be stopped prior to evacuation of the control room. Upon arrival at the shutdown panels, ensure closure of the PORVs and their block valves and that RCPs 1 and 4 are tripped by operation of the appropriate transfer switches and control switches. With the transfer of control switch in local, the PORV block valves may be opened and the PORV used to control system pressure if necessary.

4. Upon arrival at remote shutdown panel "A", transfer control of the auxiliary spray valve and ensure that the valve is in the closed position to prevent any further depressurization.

3.3 CHEMICAL AND VOLUME CONTROL SYSTEM

A. Evaluation Findings

1. Fire induced spurious closure of a VCT outlet valve (LV-0112B or LV-0112C) may result in damage to an operating centrifugal charging pump. Since both pumps are automatically started in the event of a loss of offsite power, this may lead to simultaneous failure of both pumps.

2. Fire induced spurious closure of the centrifugal charging pump minimum flow valves (HV-8111A and 8111B) may result in damage to the respective operating charging pump. Spurious closure of valve HV-8110 can result in a failure of either or both operating charging pumps.

3. Fire induced simultaneous uncontrolled opening of excess letdown valves (HV-8154, HV-8153 and HV-0123) may occur resulting in loss of RCS inventory.

4. Fire induced failure of charging pump discharge flow control valve (HV-190B) may occur resulting in inability to control pressurizer level. (Transfer of control switch does not isolate all control room circuits.)

5. Automatic charging pump suction transfer to the RWST may not occur on low volume control tank (VCT) level due to fire induced failure in a VCT level transmitter (LT-0112 or LT-0185) circuit.

B. <u>Key Monitorable Parameters (functional)</u>

1. Pressurizer level

2. Pressurizer level

3. Pressurizer level

4. Pressurizer level

5. See compensatory measures

C. <u>Time Constraints</u>

1. Loss of suction to any operating centrifugal charging pump can result in pump damage within approximately 10 seconds.

2. Loss of miniflow recirc for any operating centrifugal charging pump can result in pump damage within approximately 30 seconds (RCP seal flow considered).

3. There is no immediate concern about not being able to isolate excess letdown.

4. The operator has approximately 15 minutes to regain pressurizer level control to prevent the pressurizer from reaching an overfill condition.

5. The operator has approximately 6 minutes to transfer the charging pump suction to the RWST before the VCT is dry.

D. Operational Considerations

1. At least one centrifugal charging pump must be operational in order to control RCS inventory and RCS boration.

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3. RCS inventory control is necessary to ensure maintaining the core covered.

4. RCS inventory control is necessary to prevent overfilling the pressurizer.

5. At least one centrifugal charging pump must be operational in order to control RCS inventory and RCS boration.

E. Compensatory Measures

1. In order to reduce the potential for simultaneous charging pump failures, prior to establishing control at the remote shutdown panels, the charging pump suctions will be aligned with the RWST prior to evacuation of the control room by opening LV-112E or LV-112D.

2. Operation of the transfer of control switch for the charging pump minimum flow valves HV-8111A and HV-8111B will preclude damage to the respective centrifugal charging pump due to spurious valve closure. Operation of the remote shutdown panel transfer of control switch for valve HV-8110 will preclude simultaneous failure of both charging pumps due to spurious closure of the valve. The probability of simultaneous failure of both charging pumps due to spurious closure of HV-8110, is considered very low because the loss of offsite power condition causing both pumps to run must be coincident with a high pressurizer level condition (no charging flow to RCS except via the RCP seals).

3. To ensure isolation of excess letdown, trip breaker 14 in 125V dc panel 1ND32/2ND32 (power supply for valves HV-8154 and HV-8153).

4. Pressurizer level can be maintained from the Train "B" shutdown panel by starting and stopping the Train "B" charging pump. An alternative to this approach it to cycle the SIS boration valve,

HV-8801B, open and closed, with the Train "A" SIS boration valve HV-8801A, closed. (HV-8801A position may be determined by watching pressurizer level while charging with HV-8801B closed.)

5. The charging pump suctions will be aligned with the RWST prior to evacuation of the control room by opening LV-0112E or LV-0112D (see Compensatory Measure 3.3.E.1).

3.4 MAIN STEAM SYSTEM

A. Evaluation Findings

1. With offsite power available, steam generator overfilling can occur due to spurious opening (valves remain open) of the feedwater control valves or due to failure of the feedwater isolation valves to close on high level. These situations are aggravated by the following conditions:

   - Turbine trip occurs
   - Feedwater pumps continue to run
   - Main steam atmospheric dump valves (ADVs) do not operate
   - No automatic turbine bypass system operation

2. With offsite power available, steam generator boil dry can occur due to spurious closure of the feedwater isolation valves, closure of the feedwater control valves, or spurious opening of the turbine bypass control valves. These situations are aggravated by the following conditions:

   - No turbine trip
   - No MSIV closure
   - No main feedwater addition
   - Main steam ADVs open
   - MSR isolation valves remain open
   - SG blowdown valves remain open

3. Control of the main steam ADVs may be lost as a result of a control room fire.

B. Key Monitorable Parameters (functional)

1. Pressurizer level, RCS pressure, and S/G level

2. Pressurizer level, RCS pressure, and S/G level

3. RCS temperature.

C. Time Constraints

1. The steam generators can reach an undesirable overfill condition within approximately 2 minutes assuming full main feedwater flow.

2.a The steam generators can reach a dry condition within approximately 4.5 minutes assuming, reactor trip, MSIVs open, no main feedwater, no auxiliary feedwater, RCPs running, steam generator ADVs open, no turbine trip, steam dump full open, and no safety injection. As a result of the rapid overcooling, the reactor can return to criticality with a maximum power of about 14% at approximately 57 seconds after the initial trip.

2.b Assuming reactor trip and closure of the MSIVs, a steam generator can boil dry in approximately 13 minutes assuming no main feedwater, no auxiliary feedwater, RCPs running and the steam generator ADV open.

3. Operation of two ADVs (PV-3010 and PV-3020 in the event of a control room fire) is not required until after hot standby has been achieved, and the RCS has been borated to the cold shutdown concentration (approximately 4 hours if boration is from the BAST and 17 hours if boration is from the RWST). Operation of the other two ADVs, or establishment of some other cooling means for the idle two steam generators is desired within 2 to 4 additional hours. (If it is not possible to ensure a stable level condition in the two idle RCS loop steam generators during the cooldown then these steam generators should be allowed to boil dry.)

D. Operational Considerations

1. Steam generator level control is necessary to preclude uncontrolled RCS cooldown, depressuriza- tion, and steam generator overfill.

2. Steam generator level control is necessary to preclude uncontrolled RCS cooldown and depressurization.

3. Main steam ADV control is necessary to preclude uncontrolled cooldown (valves failed open condition) and to ensure the ability to accomplish a controlled cooldown (valves failed closed condition).

E. Compensatory Measures

1,2. To minimize the chances of a significant overcooling transient, as a result of steam generator overfill or boil dry, the MSIVs and bypasses, the feedwater isolation and bypass valves, and the steam generator blowdown isolations must be closed prior to leaving the control room.

If there is any indication of uncontrolled flow into or out of any steam generator upon arrival at the shutdown panels, trip breaker 08 in 125V dc panel 1AD11/2AD11 and breakers 03 and 08 in 125V dc panel 1AD12/2AD11 to ensure closure of the MSIVs and their bypass valves, the MFIVs and bypass valves and the steam generator blowdown isolation valves.

3. To ensure the ability to control the plant cooldown, open the power supply circuit breakers to the Train "A" mainsteam ADVs (ensures valve closure).

			UNIT 1	UNIT 2
o	PV-3000	Breaker:	1AY2A-17	2AY2A-17
o	PV-3030	Breaker:	1AY2A-18	2AY2A-18

To initiate cooldown from the Train "B" shutdown panel, transfer control of ADVs PV-3010 and PV-3020 to local then use portable plug-in signal generating type devices to position PV-3010 and PV-3020 to control the RCS cooldown rate. (Note: Procedures controlling device availability and operator training should be provided.)

3.5 AUXILIARY FEEDWATER SYSTEM

A. Evaluation Findings

1. Automatic auxiliary feedwater actuation may not occur.

2. One steam generator auxiliary feedwater control valve, for a motor driven AFW pump, may spuriously close during automatic feedwater actuation.

3. For other considerations involving the steam generators, see the Main Steam System.

B. Key Monitorable Parameters (functional)

1. Steam generator level and RCS temperature

2. Steam generator level, RCS pressure and pressurizer level.

C. Time Constraints

1. At least 30 minutes are available in which to establish auxiliary feedwater flow to the steam generators assuming:

   - o Reactor tripped
   - o RCPs tripped
   - o Steam generator ADV closed
   - o MSIVs closed
   - o No main feedwater
   - o No auxiliary feedwater

2. One steam generator level can reach an overfill condition in approximately 20 minutes, assuming no main feedwater flow and one steam generator is receiving the full flow from one motor driven pump, spurious closure of one auxiliary feedwater valve, and 1/4 of the flow from the turbine driven pump.

D. Operational Considerations

Control of auxiliary feedwater is necessary to ensure the ability to achieve safe shutdown.

E. Compensatory Measures

Auxiliary feedwater addition can be accomplished from the remote shutdown panel without spurious actuation concerns after operation of the component "transfer of control" switches.

3.6 RESIDUAL HEAT REMOVAL SYSTEM

A. Evaluation Findings

1. One or both RHR pump suction valves (HV-8701A and B for train A or HV-8702A and B for train B) can spuriously close while the pump is operating.

(Assumes plant is in shutdown cooling prior to the control room fire.)

2. Deleted

3. Fire induced spurious opening of RHR vent valve (HV-10465 or HV-10466) may occur resulting in loss of RCS inventory or RWST inventory.

4. Train B RHR heat exchanger outlet valve HV-0607 may spuriously close or bypass valve FV-0619 may spuriously open resulting in loss of RCS cooling control during Modes 4 and 5.

B. Key Monitorable Parameters (functional)

1. RCS temperature

2. Deleted

3. Pressurizer level

4. Core exit thermocouples

C. Time Constraints

1. An operating RHR pump can be damaged within approximately 30 seconds following spurious closure of its respective suction valve.

2. Deleted

3. There is no immediate concern associated with an RHR system vent valve opening. (See operational considerations).

4. There is no immediate concern associated with loss of RCS cooling control due to RHR heat exchanger outlet valve closure or bypass valve opening.

D. Operational Considerations

1. RHR system operation is necessary to achieve and maintain cold shutdown.

2. Deleted

3. RHR system vent valve closure is necessary to prevent undesired loss of reactor coolant during shutdown cooling RHR system operation. Spurious vent valve opening prior to system starting can result in limited loss of RWST volume.

4. Control of the RHR heat exchanger outlet and valve bypass is necessary to control RCS cooldown.

E. Compensatory Measures

1. Use the redundant system to regain RCS cooldown control.

2. Deleted

3. To preclude opening or to ensure closure of both RHR system vent valves HV-10465 and HV-10466, trip breaker 08 in 125V dc panel 1ND31/2ND31.

4. To ensure the ability to accomplish a cooldown using the Train B RHR system, it may be necessary to open RHR heat exchanger outlet valve HV-0607 and/or close RHR heat exchanger bypass valve FV-0619 by local isolation and venting of the valve air set instrument air supply.

3.7 NUCLEAR SERVICE COOLING WATER SYSTEM

A. Evaluation Findings

1. Fire induced spurious failures of NSCW return header temperature or pressure instruments (TE-1668/1669 and PT-11741/11742) could result in simultaneous closure of NSCW cooling tower spray header isolation valves HV-1668A/1669A and NSCW cooling tower bypass valves HV-1668B/1669B. NSCW return flow would then be limited to the capacity of relief valves PSV-11759/11766.

B. Key Monitorable Parameters (functional)

1. Steam generator level, RCS presssure and temperature.

C. Time Constraints

1a. Temporary loss of NSCW flow to a diesel generator will not damage the diesel generator (diesel trips on high jacket water temperature). Diesel operation must be restored within approximately 30 minutes to support cooldown.

1b. NSCW cooling flow to the ESF chiller units is required before these units can be started.

D. Operational Considerations

1a. Diesel generator operation is required for safe shutdown component operation in the event of loss of offsite power.

1b. Loss of the ESF chillers may impact operation of safe shutdown components.

E. Compensatory Measures

1a. If the diesel trips on high jacket water temperature before the NSCW valve control can be transferred to the remote shutdown panel, the diesel will have to be manually reset and started.

1b. After the operator has transferred control of all the components to the shutdown panel, he may have to manually restart the ESF chiller.

3.8 DIESEL GENERATOR FUEL OIL TRANSFER SYSTEM (UNIT 1 ONLY)

A. Evaluation Finding

The diesel generator fuel oil storage tank pumps may not be available for automatic makeup to the diesel fuel oil day tank.

B. Key Monitorable Parameters (functional)

None required. See Compensatory Measures.

C. Time Constraints

The diesel will run for approximately 1.4 hours with no automatic makeup assuming minimum level (level at which auto makeup should start) in the diesel generator fuel oil day tank.

D. Operational Considerations

Makeup to the diesel fuel oil day t[illegible] required in order to ensure long term operabilit[illegible] the safe shutdown equipment in the event offsite power is not available.

E. Compensatory Measures

Perform necessary repairs in the fuel oil storage tank pump electrical breaker cabinet to ensure a source of makeup to the fuel oil day tank for an operating diesel generator. (Note that tools, procedures and training are required.)

3.9 ESSENTIAL CHILLED WATER SYSTEM

A. Evaluation Findings

Loss of CBCR ESF chilled water flow through cooling unit 1-1532-A7-002/2-1532-A7-002 due to spurious closure of valve TV-12725 can result in loss of cooling to the essential Train B switchgear rooms.

B. Key Monitorable Parameters (functional)

Operator comfort at the remote shutdown panel.

C. Time Constraint

No cooling water flow through TV-12725 can result in undesired temperature increases within approximately 6 hours at the Train B remote shutdown panel and ESF switchgear areas served by the cooling unit.

D. Operational Considerations

A suitable environment for equipment operation and plant operator comfort is desired.

E. Compensatory Measures

Trip breaker 22 on 120V ac panel 1BYA1/2BYA1 to de-energize the hydraulic pump and then locally position valve TV-12725 using its associated hand pump and positioner.

3.10 ESSENTIAL SAFETY FEATURES ROOM COOLERS

A. Evaluation Findings

Loss of ventilation for the Train "B" CBCR ESF chiller room can occur due to spurious stopping of the room exhaust fan (1-1531-B7-004/2-1531-B7-004)

B. Key Monitorable Parameters (functional)

None required. See Compensatory Measures.

C. Time Constraints

There would be no temperature increase above the equipment qualification temperature for approximately 48 hours in the CBCR ESF chiller rooms following starting of the room heat loads and loss of the exhaust fans.

D. Operational Considerations

A suitable environment for equipment operation is desired.

E. Compensatory Measures

At some time during the first 2 days following a control room fire verify that the temperature in the CBCR ESF chiller room is suitable for equipment operation and provide temporary ventilation as necessary. (Note that equipment, procedures and training are necessary.)

3.11 ELECTRICAL DISTRIBUTION SYSTEM

A. Evaluation Findings

A control room fire may cause deenergizing of 480 V switchgear 1BB07/2BB07 resulting in loss of diesel generator building cooling due to spurious feeder breaker opening.

B. Key Monitorable Parameters (functional)

Steam generator levels, RCS presssure and temperature and equipment status lights.

C. Time Constraints

The diesel generator room temperature can approach a point where proper equipment operation can not be assured within approximately 15 minutes following a diesel start with no cooling system operation.

D. Operational Considerations

A suitable environment for equipment operation is required in the event offsite power is not available.

E. Compensatory Measures

The following breaker transfer of control switches must be placed in the local position and the breaker ensured closed following control room evacuation to preclude Train B diesel generator building overheating:

1. 1BA0304/2BA0304
2. 1BB0701/2BB0701

3.12 CONTAINMENT SPRAY SYSTEM

A. Evaluation Findings

A control room fire may cause a spurious containment spray actuation signal.

B. Key Monitorable Parameters

RWST level

C. Time Constraints

Containment spray must be stopped within approximately 1 hour to limit the loss of RWST inventory.

D. Operational Considerations

RWST inventory is necessary to provide RCS makeup for cooldown contraction.

E. Compensatory Measures

Locally trip and rack out both the containment spray pump breakers.

Note: It may require tripping a breaker more than once to rack out the breaker, (breaker rack out requires use of a tool).

			UNIT 1	UNIT 2
o	Pump A	breaker:	1AA02-14	2AA02-14
o	Pump B	breaker:	1BA03-14	2BA03-14

4.0 CONTROL ROOM FIRE SPURIOUS ACTUATION EVALUATION GROUND RULES

4.1 NRC GUIDELINES

1. No design basis events are assumed concurrent with a control room fire.

2. No single failures are assumed concurrent with a control room fire.

3. The control room is evacuated due to the presence of a fire.

4. No equipment is assumed to be inoperable prior to the fire due to maintenance activities.

5. The only action allowed prior to evacuation of the control room is a reactor trip initiated by the operator. No other information from indications in the control room can be used to assist the operator in determining plant status (e.g., no credit for rod bottom lights even though these are available on the same panel from which reactor trip is initiated). A deviation will be presented in FSAR Appendix 9.B for any other control room manual actions deemed necessary prior to evacuation.

6. Cold shutdown from outside the control room must be achieved and maintained, with or without the availability of offsite power, within 72 hours with limited remedial actions.

7. As consequences of the fire, hot shorts, open circuits, or shorts to ground in associated circuits must be considered.

8. Where a hi/low pressure interface (fire induced LOCA) is involved, an unlimited number of spurious control signal actions/inactions must be postulated.

9. Electrical circuitry for components used to accomplish safe shutdown, and for methods employed to mitigate or preclude the consequences of control room fire induced spurious actions/inactions, must be independent of the control room.

4.2 <u>ASSUMPTIONS AND BASES</u>

1. The control room fire is considered to be of such magnitude as to require almost immediate evacuation of both the Unit 1 and Unit 2 control room operators. However, fire induced spurious component actions/inactions shall be considered to occur in only one unit.

Basis:

The existence of smoke in the control room would impact the capability to safely control both Units 1 and 2 from the control room due to sharing of the common space, while the spacial separation between the control consoles and cabinets for the two units would limit the direct impact of a fire to only one unit.

2. A spurious control signal action/inaction is defined as being caused by a single hot short, open circuit, or short to ground, impacting either (a) a single component, or (b) the activation/inactivation of multiple components actuated by ESFAS logics such as Safety Injection (SI), Containment Spray (CS), Containnment Isolation (CI), etc.

   Basis:

   Each electrically-operated component has its own unique control circuit which may be affected by the single hot short, open circuit, or short to ground. In addition, the circuitry of an electrically operated component may be part of a logic circuit involved with activation of multiple components (i.e., SI, CS, CI, etc.), subject to the effects of a single hot short, open circuit, or short to ground, either to a relay or to an entire logic cabinet.

3. Either of the two conditions stated in Assumption 2 can be assumed to occur during any plant operating mode following the onset of a control room fire event, until action is taken to defeat or preclude the action/inaction from occurring.

   Basis:

   Because of the BTP CMEB 9.5-1 requirement to achieve and maintain cold shutdown, the plant can be in any of its normal operating modes (i.e., Modes 1 thru 6) at the time of initiation of a control room fire event.

4. In the event that offsite power is available, it is assumed that all equipment remains in its prefire condition (i.e., condition during normal plant operation for the assumed mode). In the event of loss of offsite power, all equipment goes to its designed loss of offsite power position.

Basis:

The basis for this assumption is that the components/systems will function as designed, with the exception of the actions/inactions caused by the single hot short, open circuit, or short to ground.

5. The operator will trip the reactor prior to evacuation from the control room. Credit will be taken for events which would normally be expected in conjunction with the reactor trip, except that these events are subject to the spurious control signal action/inaction.

Basis:

The NRC has stipulated that, in the event of a control room fire, credit may be taken for operator action to manually trip the reactor prior to evacuating the control room. This evaluation will take credit for the operator manually tripping the reactor. The other components/system actions normally associated with a reactor trip will perform as designed, but will be subject to the single hot short, open circuit, or short to ground in the control room circuits. A deviation will be presented in FSAR Appendix 9.B for any other control room manual actions deemed necessary prior to evacuation.

6. The analysis will be performed on a system basis for the fire area being evaluated (in this case, the control room). Systems interfacing with the systems identified in Table 2-1 will be evaluated to determine their impact on systems required for safe shutdown.

Basis:

NRC Generic Letter 81-12 allows the choice of evaluating on a system or fire area basis.

7. There will be some time interval between the onset of the control room fire event (time t=0) and that time when the operator can reasonably be expected to be able to counter the adverse effects of the spurious action/inaction (t=15 minutes). This time interval shall be quantified.

Basis:

This assumption is intended to reflect the "real world" situation an operator may face as a result of the control room fire. It has been determined that transfer of control and plant realignment can be accomplished within 15 minutes of leaving the control room. This evaluation will define time constraints to allow assigning priorities to necessary operator actions for plant procedure development.

8. All plant operating modes except refueling will be evaluated (i.e., Modes 1, 2, 3, 4, and 5).

   Basis:

   There is sufficient time during the refueling mode (Mode 6) for an operator to assess plant status and respond to conditions without jeopardizing reactivity control or fission product boundary integrity.

9. Only components with circuits routed to or from the control room are subject to this evaluation.

   Basis:

   The evaluation scenario is for a fire in the control room, and therefore, any equipment with circuits in the control room will be considered in this evaluation as being subject to the single hot short, open circuit, or short to ground.

10. Turbine trip does not necessarily result in a loss of offsite power (LOP) condition.

    Basis:

    Given a turbine trip, it may be more conservative to assume that a LOP condition does not occur. The turbine trip circuitry is subject to the single hot short, open circuit, or short to ground.

11. Control of the plant cooldown will be accomplished at the Train B remote shutdown panel.

    Basis:

    As part of the VEGP design, only the Train B vital instrumentation circuitry has been isolated from potential control room fire damage. (See Assumption 14)

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Basis:

As part of the VEGP design, only the Train B vital instrumentation circuitry has been isolated from potential control room fire damage. (See Assumption 14)

12. No single (including common mode) failures in addition to the spurious action/inaction will be evaluated.

Basis:

The BTP CMEB 9.5-1 scope does not consider any failures other than those caused by the fire.

13. For this evaluation, the spurious action/inaction shall be assumed to result in the least desirable action/inaction.

Basis:

For an electrical component, the only failure initiators are hot shorts, open circuits or shorts to grounds. Since all three conditions must be postulated, the assumption that all adverse conditions will happen to the subject component(s) yields a conservative evaluation. Further circuit analysis is required to eliminate an assumed concern.

14. Key monitorable parameter(s) shall be sufficient to enable the operator to identify the occurrence of a spurious control signal action/inaction and monitor the mitigation processes (if this "criteria" is not met, recommendations to satisfy it shall be made). The following Train B instruments and control loops are isolated from the control room, and will be utilized to assess overall plant conditions.

- o Neutron Flux (Reg. Guide 1.97 Fission Chamber), RE-13135
- o Core Exit Temperature (quadrant 2 and 3)
- o RCS Wide Range Cold Leg Temperature, TE-0423B and TE-0433B
- o RCS Wide Range Pressure, PT-0403
- o Steam Generator 2 and 3 Wide Range Level, LT-502 and LT-503
- o Pressurizer Level, LT-460
- o RPV Head Vent Throttle Control (OIM), HCV-0442B
- o Accumulator Tank Gas Vent Control (OIM), HCV-0943B
- o Condensate Storage Tank Level, LI-5100 and LI-5115 (Local)
- o RWST Level LI-0990C (local device)
- o BAST Level PI-10115 or PI-10116 (local devices)

Basis:

In order to aid in control of the plant, the design of both Train A and Train B equipment allows for disconnecting of control room circuits through the use of transfer switches located at the remote shutdown panels and other local control stations. Similarly, the instrumentation and control loops (Train B only) listed in this assumption are electrically isolated from the control room to provide parameters for use by an operator in assessing overall plant conditions. There are also other means available to an operator to assess component conditions; i.e., local breaker/switch position, local valve position indication, etc.

15. Components or devices which can not impair safe shutdown operation or control by their actuation or malfunction are considered not to affect safe shutdown.

Basis:

BTP CMEB 9.5-1 requires being able to achieve and maintain cold shutdown. Any systems/components not impairing safe shutdown are not within the scope of this evaluation.

16. Evaluation drawings will be project documents controlled by Bechtel Drawing and Data Control (DDC). Examples are:

    P&IDs
    Elementary Diagrams
    Loop Diagrams
    One-Line Diagrams
    Controlled Vendor Prints

Basis:

The identification of the controlled drawings defines the source material used for the evaluation and aids in traceability and reproductibility of results.

17. Protection of nonsafe shutdown equipment is not a priority item of this evaluation.

Basis:

The BTP CMEB 9.5-1 requirement is to achieve and maintain cold shutdown to protect the health and safety of the public.

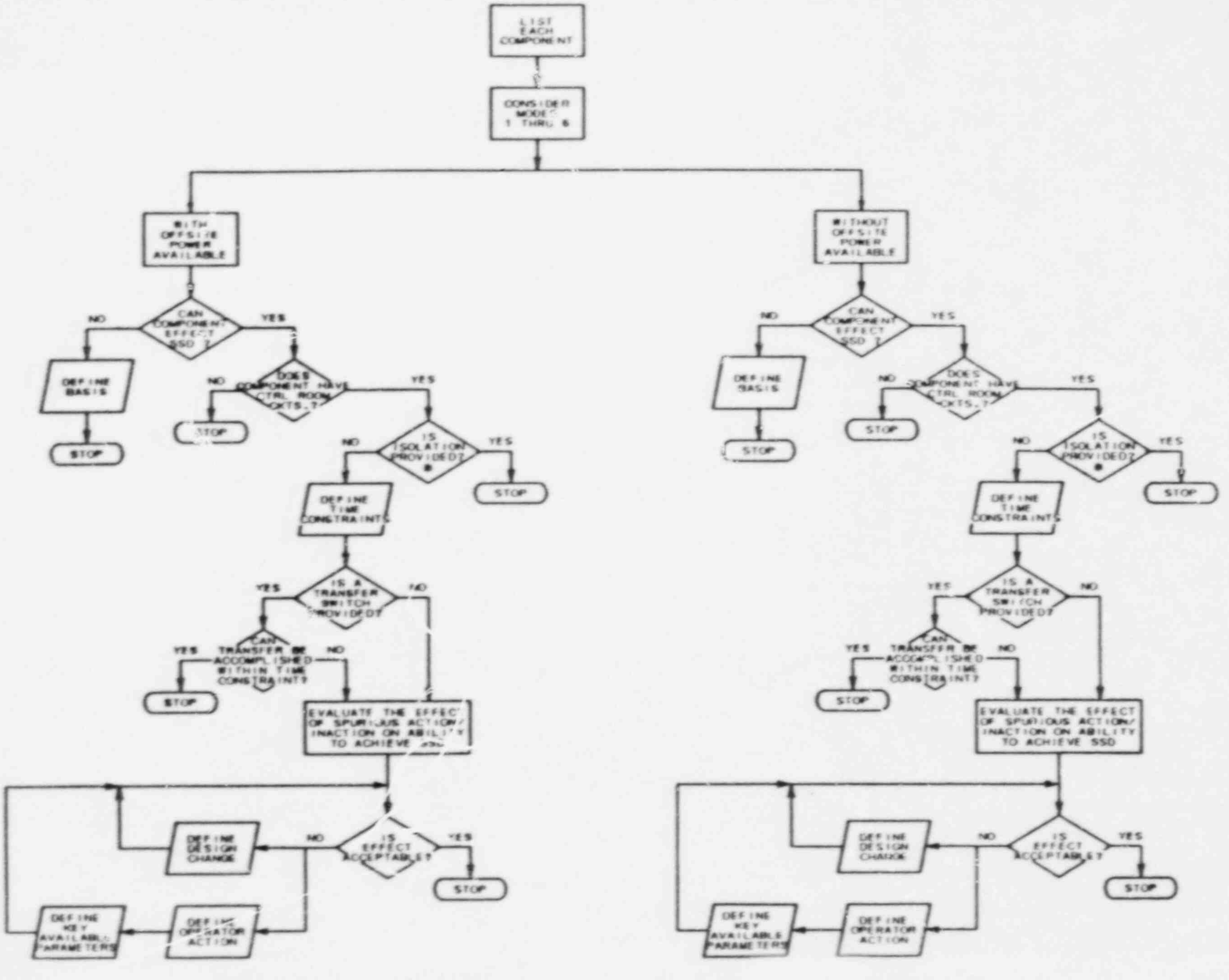
18. Fire induced circuit damage can not result in loss of reactor coolant pump seal cooling due to a spurious actuation.

Basis:

Either auxiliary component cooling water system operation or CVCS seal injection is required to maintain the integrity of the reactor coolant pump seals. These systems are physically independent of each other and each system has redundant pumps (powered from the redundant Class 1E electrical distribution system) which share common piping within the respective system. There is no single signal caused by fire damage that can result in loss of both means of cooling (temporary loss of seal cooling during load shedding and load sequencing is acceptable).

5.0 CONTROL ROOM FIRE ALTERNATE SHUTDOWN EVALUATION LOGIC

The following figure details the logic used in performing the evaluation for each component of the Table 2-1 systems in the event of a control room fire.



VEGP CONTROL ROOM FIRE ALTERNATE SHUTDOWN EVALUATION LOGIC DIAGRAM

* REFERS TO INSTRUMENTATION REQUIRED FOR SAFE SHUTDOWN. OTHER DEVICES FOLLOW THE "NO" PATH.