REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8105260431 DOC.DATE: 81/05/19 NOTARIZED: NO DOCKET #
FACIL:50-244 Robert Emmet Ginna Nuclear Plant, Unit 1, Rochester G 05000244
AUTH.NAME AUTHOR AFFILIATION
MAIER,J.E. Rochester Gas & Electric Corp.
RECIP.NAME RECIPIENT AFFILIATION
CRUTCHFIELD,D.M Operating Reactors Branch 5

SUBJECT: Forwards addl info re mods of fire protection dedicated shutdown sys,in response to 810220 ltr.Sys design is conceptual & still being developed.First phase of engineering expected to be completed by Fall 1981.

DISTRIBUTION CODE: A001S COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 60
TITLE: General Distribution for after Issuance of Operating License

NOTES:1 copy:SEP Sect. Ldr. 05000244

	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL
ACTION:	CRUTCHFIELD	04	13	13				
INTERNAL:	D/DIR,HUM FAC	08	1	1	DIR,DIV OF LIC		1	1
	I&E	06	2	2	NRC PDR	02	1	1
	OELD	11	1	0	OR ASSESS BR	10	1	0
	RAD ASMT BR		1	1	REG FILE	01	1	1
EXTERNAL:	ACRS	09	16	16	LPDR	03	1	1
	NSIC	05	1	1				

MAY 27 1981

TOTAL NUMBER OF COPIES REQUIRED: LTTR ~~40~~ 41 ENCL ~~38~~ 39

RG AND E
ROCHESTER GAS AND ELECTRIC CORPORATION • 89 EAST AVENUE, ROCHESTER, N.Y. 14649

JOHN E. MAIER
VICE PRESIDENT

TELEPHONE
AREA CODE 716 546-2700

May 19, 1981

Director of Nuclear Reactor Regulation
Attention: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Fire Protection Dedicated Shutdown System
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Crutchfield:

In response to 10 CFR 50.48 and Appendix R to 10 CFR Part 50, we submitted a report on March 19, 1981 which described potential modifications at the R. E. Ginna Nuclear Power Plant for a dedicated shutdown system. The potential modifications are the result of a fire protection safe shutdown study submitted December 28, 1979 and an ongoing design effort. The enclosed report gives additional information about the dedicated shutdown system and responds to Mr. Darrell Eisenhut's letter of February 20, 1981. The dedicated shutdown system design is based upon the assumption that no detection, no automatic suppression, and no fire brigade suppression is effective in controlling or limiting fire damage.

The system design is conceptual and is still being developed. We expect to have completed our first phase of engineering by the Fall of this year. At that time we will be prepared to develop detailed designs, for example, specific electrical circuits, to fulfill the requirements of design criteria prepared for the conceptual design. We also anticipate that the conceptual design may be changed over the next several months as the result of other regulatory concerns. As we pointed out in our March 19 letter, Systematic Evaluation Program topic reviews may result in plant modifications which should be integrated with the dedicated shutdown system. Seismic operability of equipment and high energy line pipe break are examples of two SEP topics which may effect the dedicated shutdown system design.

A001
S
1/1

 F

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Since most SEP topics are scheduled to be completed by Fall 1981 with integrated assessment coming thereafter, neither the dedicated shutdown system design nor the SEP integrated assessment should be hindered by the other program.

We will inform you if we find it necessary to substantially change the conceptual design of the dedicated shutdown system.

Very truly yours,

John E. Maier

Enclosure

DEDICATED SHUTDOWN SYSTEM
CONCEPTUAL DESIGN

R. E. GINNA NUCLEAR POWER PLANT
Docket No. 50-244

Information Submitted In Response to
Darrell Eisenhut's letter dated February 20, 1981

ROCHESTER GAS AND ELECTRIC
CORPORATION

ROCHESTER, NEW YORK

May 1981

The NRC positions and the RG&E response in this report are labeled to correspond with the enclosures to Darrel Eisenhut's letter dated February 20, 1981.

ENCLOSURE 1

NRC Position

8a. Provide a description of the systems or portions thereof used to provide the shutdown capability and modifications required to achieve the alternate shutdown capability if required.

RESPONSE

The functional and hardware requirements for achieving a safe-shutdown condition are addressed in the R. E. Ginna Unit No. 1 Safe Shutdown Capability Assessment and Proposed Modifications report submitted March 19, 1981. These requirements, which are directed at achieving and maintaining a cold-shutdown condition, are summarized on Table 1, which is extracted from the referenced submittal.

In the existing plant configuration, fires occurring in some areas may impair the use of some or all of this equipment, primarily through effects on power and control cables. Consequently, provisions will be made for the transfer of power and/or the control of selected components necessary to mitigate the consequences of a severe fire in critical plant areas (e.g., the control room, relay room, battery room, or cable tunnel).

The dedicated shutdown system proposed in the March 19, 1981 report will encompass the following existing and new plant features:

- o Dedicated shutdown instrumentation (primary and secondary systems)

- Charging pump 1A
- Dedicated charging pump room cooling unit
- Safety injection pump 1A and associated cooling unit
- Pressurizer and main steam PORVs
- Turbine-driven auxiliary feedwater pump steam supply valve
- Standby auxiliary feedwater pump 1A and associated valves
- Residual heat removal pump 1A, heat exchanger, and associated valves
- Component cooling pump 1A, heat exchanger, and associated valves
- Service water pump 1A and associated valves
- 480-V switchgear bus for shutdown-related loads
- Alternative 125-Vdc power supply
- Alternative 120-Vac power supply
- Instrument air compressor 1A
- Remote shutdown control panel
- Diesel generator 1A

The systems and components used to provide the shutdown capability are described on Table 1. The modifications required to ensure the operability of at least the minimum equipment complement are summarized as follows:

Dedicated Shutdown instrumentation.

To ensure the availability of displays of critical shutdown-related parameters, dedicated shutdown instrumentation will be installed. The following new dedicated instrument channels will be installed, with displays located on the remote shutdown control panel:

- o Pressurizer level
- o Reactor coolant system pressure
- o Reactor coolant system temperature
- o Main steam line pressure
- o Steam generator level
- o Condensate storage tank level
- o Safety injection discharge line flow
- o Residual heat removal system flow
- o Charging flow

These instrument loops will be continuously powered by the alternative 120-Vac power source, which is ultimately supplied by the dedicated 125-Vdc battery system.

Dedicated Shutdown Pumps and Associated Cooling Units

Charging Pump 1A

A transfer switch will be provided on the dedicated shutdown control (DS) panel to disable the existing remote control of charging pump 1A and to transfer control of the pump to a local switch on the DS panel. The transfer to local control will be annunciated in the control room. Charging pump 1A will be fed by a breaker located in the dedicated shutdown 480-V switchgear bus. During alternative shutdown operation, 125-Vdc control power for this bus will be supplied by the dedicated 125-Vdc battery system.

To ensure the long-term operability of charging pump 1A in the dedicated shutdown mode, a dedicated cooling unit will be provided to accommodate the heat loads generated by the pump and its support equipment. This cooling unit will be controlled from the DS panel, and it will be powered by the dedicated shutdown 480-V switchgear bus.

The modification will be implemented in a similar manner for the following pumps:

- Safety injection pump 1A (and associated cooling unit)
- Standby auxiliary feedwater pump 1A
- Residual heat removal pump 1A
- Component cooling pump 1A
- Service water pump 1D

In addition, selected valves associated with the above pumps (needed to establish proper flow paths) will be provided with control transfer capabilities. Transfer switches will be provided on the DS panel to disable the existing remote controls and to transfer control of the valves to local switches on the DS panel. The transfer to local control will be annunciated in the main control room. These valves will be operated by motor starters that are fed by the dedicated shutdown 480-V switchgear bus. During dedicated shutdown operation, 125-Vdc control power for these starters will be supplied by the dedicated 125-Vdc system.

Pressurizer and Main Steam PORVs

The pressurizer PORVs are subject to spurious opening in the event of a fire that damages the control cables for these valves. Consequently, controls will be provided (on the DS panel) for interruption of control power to the PORV actuators. By interrupting control power, the PORVs will be closed. Actuation of the PORVs can then be accomplished by local manual (air-assisted) operation. Actuation of the control power disconnect switches will be annunciated in the main control room.

The DS panel will also be provided with position indication lights for the main steam PORVs. These lights, which will be independent of the existing position indication circuits, will be used in conjunction with local manual control to operate the main steam PORVs on an as-needed basis.

Turbine-driven Auxiliary Feedwater Pump Steam Supply Valve

This valve will be provided with auxiliary controls and position indication on the RSC panel. These controls will be activated through a remote manual transfer switch; actuation of this switch will be annunciated in the control room. Control power for the valve (when operating in the auxiliary shutdown mode) will be supplied from the dedicated 125-Vdc system.

Instrument air compressor 1A

Although instrument air is not required for safe shutdown and cooldown, power and control circuits for instrument air compressor A will be modified to provide the capability to operate the compressor during and after a fire event. The compressor will be powered from the dedicated shutdown 480-V switchgear bus.

General shutdown and cooldown methods are described in the March 19, 1981 Safe Shutdown Assessment report. The preferred methods of cooldown involve steam release from the steam generators. Only if steam generator cooling is unavailable will the pressurizer PORVs (which will use instrument air) be used to cool down the plant. The instrument air supply will be modified to provide capability for operation of the pressurizer PORVs and the RWST to charging pump supply valve. To ensure that instrument air will be made available to the pressurizer PORVs, alternative controls will be provided for the instrument air containment isolation valve.

The circuit isolation and control transfer concepts applied to these alternative controls will be identical to those described herein for other shutdown-related modifications.

Miscellaneous motor-operated valves

Several motor-operated valves (required for safe shutdown) will be provided with alternative controls and status indication on the DS panel. These controls will be implemented in a manner similar to that described for the turbine-driven auxiliary feedwater pump steam supply valve. All controls will be activated through transfer switches, which will disable the existing (control room) controls and transfer control of the valves to the DS panel. Activation of these transfer switches will be annunciated in the control room.

Valves to be provided with alternative controls include the following:

- Safety injection train A valves
- Charging train A valves
- Service water isolation valves in auxiliary building

Safe-Shutdown Electrical Distribution System

The 480-V safe shutdown loads will be permanently assigned to a 480-V switchgear bus (14A) which can be made separate and independent of the existing switchgear. This configuration is shown on Figure 1. Under normal operating conditions, this bus will be fed from the existing train A switchgear. During and after a fire event, however, this bus will be isolated from the non-shutdown-related switchgear and will be fed directly from the train A diesel generator.

Alternative sources of 125-Vdc and 120-Vac power will be provided by dedicated systems located in an existing facility in a non-safety-related area of the plant site (Technical Support Center). This building is physically isolated from those areas containing the safety-related 125-Vdc and 120-Vac systems, and is not susceptible to damage from any fire affecting those systems or their associated cables.

TABLE 1

FUNCTIONAL AND HARDWARE REQUIREMENTS FOR ACHIEVING AND MAINTAINING COLD SHUTDOWN CONDITIONS

Plant Functional Requirements	Equipment Functional Requirements	Alternative Shutdown Equipment Requirements
Monitor and control primary system inventory and pressure	Monitor RCS inventory	One dedicated wide-range pressurizer level indicator
	Provide borated makeup water	One charging pump (1A) and injection path or one SI pump (1A) and injection path
	Borated makeup water source	RWST
	Monitor RCS pressure	One dedicated wide-range pressure indicator
	Pressure control-increase	One charging pump (1A) and injection path or one SI pump (1A) and injection path
	Pressure control-decrease	One pressurizer PORV or one main steam PORV

TABLE 1 (continued)

TABLE 1 (continued)

FUNCTIONAL AND HARDWARE REQUIREMENTS FOR ACHIEVING AND MAINTAINING COLD SHUTDOWN CONDITIONS

Plant Functional Requirements	Equipment Functional Requirements	Alternative Shutdown Equipment Requirements
Remove decay heat by:		
a) Feedwater addition to the steam generators with steam venting to system atmosphere	Provide feedwater	One pump (turbine-driven) and associated valve train or one SBAFW pump and its valve train
	Monitor steam generator level	One dedicated wide-range level indicator per loop
	Vent main steam to atmosphere	One main steam PORV and positioner
	Monitor RCS temperature	One dedicated temperature sensor and associated instrumentation

TABLE 1 (continued)

TABLE 1 (continued)

FUNCTIONAL AND HARDWARE REQUIREMENTS FOR ACHIEVING AND MAINTAINING COLD SHUTDOWN CONDITIONS

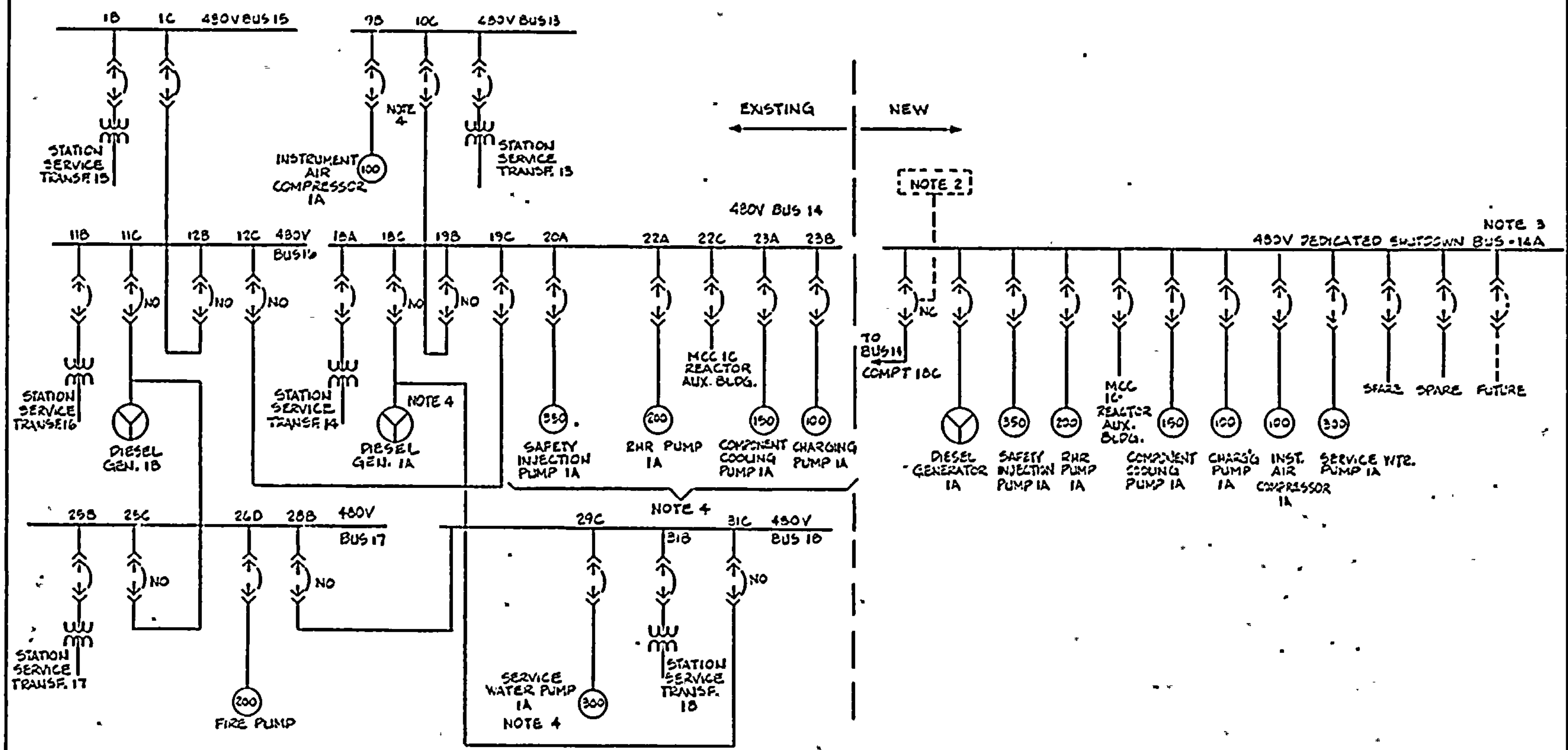
Plant Functional Requirements	Equipment Functional Requirements	Alternative Shutdown Equipment Requirements
b) Decay heat removal to cold shutdown	Remove residual heat	One RHR pump (1A), heat exchanger (1A), and associated valve train. If RHR is unavailable, utilize secondary coolant loop in solid steam generator operation
Verify reactor is subcritical	Monitor RCS boron concentration to ensure that subcriticality is maintained	One sample cooler HX and valve train
Auxiliary services required by the components that directly perform the above functions	Component cooling	One pump (1A), HX (1A) and associated valve train
	Service water	One pump (1A) and associated valve train
	480-Vac power distribution	One 480-V power division (A)
	120-Vac power distribution	Dedicated 120-Vac system (non-safety-related)

TABLE 1 (continued)

TABLE 1 (continued)

FUNCTIONAL AND HARDWARE REQUIREMENTS FOR ACHIEVING AND MAINTAINING COLD SHUTDOWN CONDITIONS

Plant Functional Requirements	Equipment Functional Requirements	Alternative Shutdown Equipment Requirements
	125-Vdc power distribution	Dedicated 125-Vdc system (non-safety-related)
	Emergency power source	One diesel generator (1A) and support systems
	Pump cooling: RHR, charging, and SI	One cooler per system
Auxiliary services provided for operator convenience	Instrument air	One compressor (1A), containment isolation valve



NOTES:

1. THIS DIAGRAM ONLY DEPICTS SHUTDOWN-RELATED EQUIPMENT, AND IS NOT INTENDED TO SHOW THE COMPLETE 480V DISTRIBUTION.
2. REMOTE TRIP/CLOSE FROM REMOTE SHUTDOWN CONTROL PANEL LOCATED IN TECHNICAL SUPPORT CENTER.
3. LOCATED IN AUXILIARY BUILDING.
4. ABANDON EXISTING CONNECTION, RECONNECT TO 480V DEDICATED SHUTDOWN BUS 14A.
5. NO INDICATES BREAKER NORMALLY OPEN. NC INDICATES BREAKER NORMALLY CLOSED.

R.E. GINNA NUCLEAR STATION
DEDICATED SHUTDOWN
480 V POWER DISTRIBUTION
FIGURE 1

8b. System design by drawings which show normal and alternate shutdown control and power circuits, location of components, and that wiring which is in the area and the wiring which is out of the area that required the alternate system.

RESPONSE

A description of the systems used to provide normal and alternative shutdown capabilities is given in the response to Question 8a and in the March 19, 1981 report, Safe Shutdown Capability Assessment and Proposed Modifications.

All new components that provide alternative power or control capabilities for dedicated shutdown operation will be located and/or protected so that dedicated power sources or control station(s) will not be affected by any fire that could damage the normal shutdown systems. To the extent practicable, all conduits and cable for the dedicated shutdown components will be routed through areas that will not be affected by fires that can damage systems normally required for shutdown.

At this time, the dedicated shutdown system design is conceptual. Consequently, detailed design drawings of dedicated shutdown cable and conduit routing have not yet been developed. However, Table 2 is a matrix that identifies the fire zones occupied by the existing "normal" control and power cables, and identifies the principal zones that will be occupied by dedicated shutdown circuits. This table does not differentiate between control and power cables, but indicates whether any essential control or power cables for a component are located in a given fire zone.

ALTERNATIVE SHUTDOWN SYSTEMS AND COMPONENTS	CRITICAL FIRE ZONES CONTAINING NORMAL AND/OR ALTERNATIVE SHUTDOWN CABLES																														
	ABBE	ABBN	ABMS	ABMM	ABMW	ABOS	ABON	ABRH	AHR	BRIA	BRIB	CTEL CTEW CTNS	CV	EGIA	EGIB	EGAV	EGBV	IBBE	IBBN	IBMN	SAF	SHM	RR	CC	SHOP	TBBE	TBBW	TBMN	TBMS	OS	TSC
1. INSTRUMENTATION																															
a. RCS PRESSURE				N	N				N			N	(2)					N	N				N	N							A
b. PRESSURIZER LEVEL	N	N		N					N			N	(2)					N	N				N	N							A
c. RCS TEMPERATURE		N							N			N	(2)					N					N	N							A
d. STEAM GENERATOR LEVEL				N	N				N			N	(2)					N	N				N	N							A
e. MAIN STEAM LINE PRESSURE									N			N						N,A	N	(2)			N	N							A
f. RWST LEVEL		(2)		N	N				N			N											N	N							A
g. CONDENSATE STORAGE TANK LEVEL												N						N	N				N	N		N					A
h. SI SYSTEM FLOW												N											N	N							A
i. CHARGING PUMP FLOW		N		N	N				N			N											N	N							A
j. RHR SYSTEM FLOW				N	N				N			N											N	N							A
2. PRIMARY SYSTEM INVENTORY AND PRESSURE CONTROL																															
a. CHARGING PUMP 1A AND VALVE TRAIN	(3)	N,A	N	N	N		N		N	N		N	(2)					N					N	N							A
CHARGING PUMP ROOM COOLER	(3)	(2)		N			N			N																					
OR																															
b. SAFETY INJECTION PUMP 1A AND VALVE TRAIN		(2)	N	N	N		N		N	N	N	N	(2)										N	N							A
SAFETY INJECTION PUMP COOLING UNIT 1A		(2)		N,A		N,A	N																N	N							A
c. PRESSURIZER PORV STATUS INDICATION		N		N	N		N		N			N	(2)					N					N	N							A
3. DECAY HEAT REMOVAL																															
a. TURBINE DRIVEN AUXILIARY FEEDWATER PUMP AND VALVE TRAIN									N	N	N	N						N,A	(2)	(2)			N	N		N	N				
OR																															
b. STANDBY AUXILIARY FEEDWATER PUMP 1C AND VALVE TRAIN		N	N	N	N	N	N		N			N									(2)		N	N							
c. RESIDUAL HEAT REMOVAL PUMP 1A, HEAT EXCHANGER, AND VALVE TRAIN		N	N	N	(2)		N	(2)	N			N	(2)					N					N	N							A
d. MAIN STEAM PORVs									N	N	N	N						N,A	N,A	(2)			N	N		N					A
4. AUXILIARY SERVICES																															
a. COMPONENT COOLING PUMP 1A, HEAT EXCHANGER, AND VALVE TRAIN				N	N	(2)			N			N											N	N							A
b. SERVICE WATER PUMP 1A AND VALVE TRAIN			N,A	N,A		(2)			N	N	N	N		N	N	N	N	N	N			N,A	N	N	(2)	N	N	N	N	A	A
c. 480 V POWER DIVISION A				N			(2)			N		N		N		N	N														A
d. 120-VAC DISTRIBUTION SYSTEM				N					N	N	N	N											N	N						A	(2)
e. 125-VDC DISTRIBUTION SYSTEM			N	N			N			N	N	N											N	N						A	(2)
f. DIESEL GENERATOR 1A				N					N	N	N	N		(2)		N	N						N	N	N					A	A

NOTES

1. THE FIRE ZONE ACRONYMS ARE DEFINED IN APPENDIX 1 OF THIS SUBMITTAL. FIRE ZONES ARE AS DESCRIBED IN THE R. E. GINNA SAFE SHUTDOWN FIRE STUDY, DATED DECEMBER 23, 1979, EXCEPT:
   OS = OUTSIDE AUXILIARY AND TURBINE BUILDINGS
   TSC = TECHNICAL SUPPORT CENTER
2. DEDICATED SHUTDOWN COMPONENT (TRANSDUCER, VALVE, PUMP, ETC.) IS LOCATED IN THIS ZONE. NORMAL AND DEDICATED SHUTDOWN CIRCUITS WILL NECESSARILY BE ROUTED THROUGH THIS COMMON ZONE.
3. CHARGING PUMP ROOM WILL BE ENCLOSED BY THREE HOUR RATED BARRIERS, SO THAT CHARGING PUMPS AND COOLER WILL BE IN A NEW FIRE ZONE, SEPARATE FROM ABBN.
4. N INDICATES NORMAL CONTROL, POWER, OR INDICATION CIRCUITS LOCATED IN THIS ZONE.
   A INDICATES ALTERNATIVE CONTROL, POWER, OR INDICATION CIRCUITS LOCATED IN THIS ZONE.

R. E. GINNA NUCLEAR STATION
DEDICATED SHUTDOWN MODIFICATION
NORMAL AND ALTERNATIVE SHUTDOWN CABLES BY FIRE ZONE

TABLE 2

8c. Demonstrate that changes to safety systems will not degrade safety systems (e.g., new isolation switches and control switches should meet design criteria and standards in FSAR for electrical equipment in the system that the switch is to be installed; cabinets that the switches are to be mounted in should also meet the same criteria (FSAR) as other safety related cabinets and panels; to avoid inadvertent isolation from the control room, the isolation switches should be keylocked, or alarmed in the control room if in the "local" or "isolated" position; periodic checks should be made to verify switch is in the proper position for normal operation; and a single transfer switch or other new device should not be a source for a single failure to cause loss of redundant safety systems).

RESPONSE

The dedicated shutdown modification will not impact the physical integrity of the shutdown system components. The only penetrations into the existing system pressure boundaries will be for the installation of new instrument lines for new dedicated shutdown system instrumentation. The modification will not impact the system process and the shutdown capability will continue to meet all of the original mechanical and operational design criteria.

The electrical portion of the modification will comply with the original design criteria for engineered safety features as described in Chapters 7 and 8 of the Ginna FSAR.

The modification will provide for:

Separation of redundant circuits

Where safety-related circuits are modified, new wiring and components will be installed so that the separation requirements of Regulatory Guide 1.75 are met. The basis for the modification dictates that power and control wiring for selected components (e.g., one charging pump, one service water pump) be rerouted so that cables serving redundant pumps will not pass through common fire areas except for the area containing the dedicated shutdown component (s).

Fault isolation for safety-related circuits and power supplies

Electrical isolation, in accordance with Regulatory Guide 1.75, will be provided to ensure that external faults (fire-induced) will not degrade existing or new safety-related electrical systems.

Separation of safety and nonsafety-related circuits

Isolation devices and/or physical separation will be provided to ensure that failures in non safety-related circuits will not jeopardize adjacent safety-related circuits (see responses to items 8b, d, and e).

Annunciation in main control room on bypass or assumption of local control.

For those components provided with a "control transfer" feature, auxiliary contacts on each control transfer switch will be used to provide annunciation in the control room when the component is switched out of its normal mode.

This annunciation feature will be implemented for all alternative shutdown components having normal/dedicated control capabilities.

Interlocks and/or administrative controls to limit the consequence of faulted conditions

Electromechanical interlocks on selected circuit breakers will prevent the inadvertent cross-connection or simultaneous faulting of redundant power supplies.

Seismic installation in safety-related areas or safety-related cabinets

Interfaces with existing seismic cabinets and new cabinets and their included components will be designed to remain functional through a safe shutdown earthquake (SSE). In general, the dedicated shutdown system will not be seismically designed, however, those components required to meet seismic criteria for other purposes will not be degraded by the installation of this system. For example, the dedicated shutdown panel will not be seismically designed though the interfaces with existing safety related circuits will meet seismic criteria.

Single-failure criterion

The dedicated shutdown system will be a single train system. However, where it interfaces with safety-related components, all new components and interfaces will be designed so that a single failure cannot cause the loss of redundant safety systems. The modifications affect only one of redundant equipment trains (e.g., one charging pump, one component cooling pump). The failure of one of these equipment trains will not initiate the failure of the redundant train; electrical and physical separation of the redundant trains will not be degraded as a result of the modification.

8d. Demonstrate that wiring, including power sources for the control circuit and equipment operation for the alternate shutdown method, is independent of equipment wiring in the area to be avoided.

RESPONSE

As discussed in the response to Question 8(a), the intent of the dedicated shutdown modification is to ensure the operability of at least one train of components, in the event of a fire in any single fire zone, to perform all functions required to achieve cold shutdown conditions. Several fire zones have been identified as "critical" in that cables for redundant shutdown-related components are routed through these areas. Consequently, a severe fire in one of these areas may incapacitate redundant equipment trains by destroying power and control cables or by damaging power supplies (switchgear, motor control centers, or batteries). The critical areas include the control room, cable tunnel, relay room, battery rooms, air handling room, and diesel generator cable vaults.

All cables serving dedicated shutdown components will be routed so as to avoid these areas. In addition, the dedicated shutdown cables will be routed so as to avoid routing redundant cables (serving the normal and dedicated device) through the same fire zone wherever possible. Where redundant circuits must be routed through the same fire zone, and adequate spatial separation cannot be achieved, separation in the form of rated fire barriers will be provided or it will be shown that other equipment is available for safe shutdown.

Power sources (480 Vac, 125 Vdc, 120 Vac) for shutdown and cool-down operation will be located so that the normal and dedicated sources are not exposed to common fire hazards. The normal (safety-related) 125 Vdc and 120 Vac sources are located in battery rooms 1A and 1B; much of the Division 1/Division 2 wiring is exposed to common fire hazards, despite the separation of equipment into two rooms. To circumvent this problem while minimizing the amount of cable rerouting required, the dedicated 125 Vdc and 120 Vac sources are located in the Technical Support Center/AVT building area, which is physically remote from the battery rooms. The dedicated shutdown 480-Vac bus will be located in the vicinity of existing Bus 14 to minimize cable routing problems. Routing of cables connected to these power sources will be in accordance with the separation criteria described above.

8e. Demonstrate that alternate shutdown power sources, including all breakers; have isolation devices on control circuits that are routed through the area to be avoided, even if the breaker is to be operated manually.

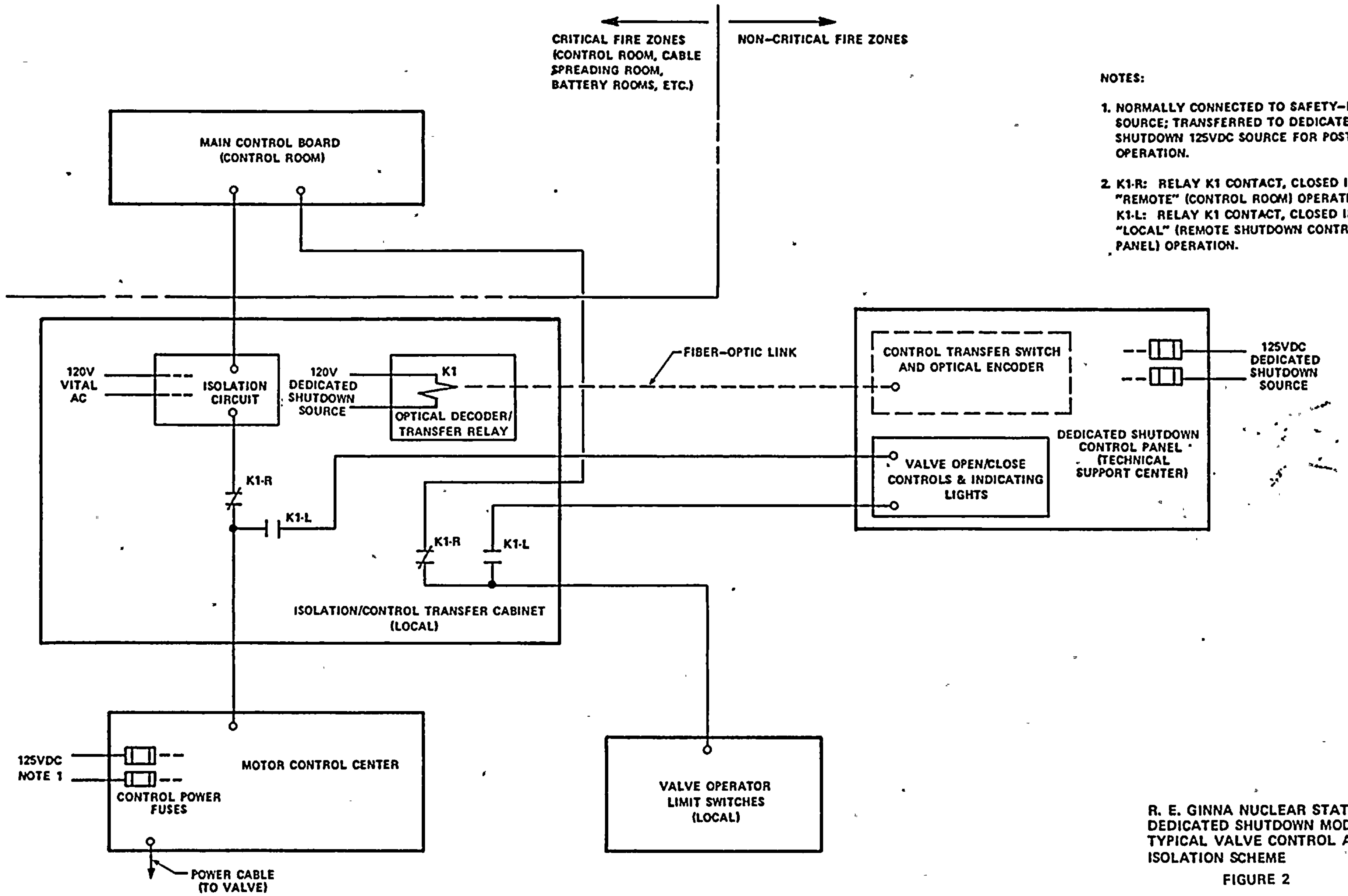
RESPONSE

Figure 2 depicts a typical control and isolation scheme for a motor-operated valve; a single lead is shown as a typical representation of all control wires. Similar control/isolation schemes will be installed for other shutdown-related components (e.g., pumps, circuit breakers) as required.

When operating in the normal mode (from control room), all wiring between the control room and the motor control center or switchgear is buffered through local isolation circuits. The "areas to be avoided" are the critical fire areas encountered between the control room and motor control center or switchgear, and include the control room itself, the relay room, cable tunnel, battery rooms, and air handling room.

While permitting normal operation of control circuits, the isolation devices provide 600-V isolation protection for the control circuits from external faults. This level of isolation exceeds the maximum credible impressed voltage on the control circuits, regardless of cable failure mode.

In addition, when operating in the normal mode, the dedicated control circuits (DS panel) are completely isolated from the motor control center or switchgear by open contacts of the control transfer relay. These contacts will provide a minimum of 600-V isolation, so that no credible fire-induced failure of the DS circuits can affect the normal control circuits when operating from the control room.



NOTES:

1. NORMALLY CONNECTED TO SAFETY-RELATED SOURCE; TRANSFERRED TO DEDICATED SHUTDOWN 125VDC SOURCE FOR POST-FIRE OPERATION.

2. K1-R: RELAY K1 CONTACT, CLOSED IN "REMOTE" (CONTROL ROOM) OPERATION.
K1-L: RELAY K1 CONTACT, CLOSED IN "LOCAL" (REMOTE SHUTDOWN CONTROL PANEL) OPERATION.

R. E. GINNA NUCLEAR STATION
DEDICATED SHUTDOWN MODIFICATION
TYPICAL VALVE CONTROL AND ISOLATION SCHEME

FIGURE 2

8f. Demonstrate that licensee procedure(s) have been developed which describe the tasks to be performed to effect the shutdown method. A summary of these procedures should be submitted.

RESPONSE

RG&E has developed a series of procedures (SC 3.15) to respond to fire emergencies with the current plant configuration. These procedures are available for inspection on site. When the dedicated shutdown system is installed, the existing procedures will be revised where necessary, or new procedures will be provided, which describe the tasks to be performed to achieve cold shutdown.

8g. Demonstrate that spare fuses are available for control circuits where these fuses may be required in supplying power to control circuits used for the shutdown method and may be blown by the effects of a cable spreading room fire. The spare fuses should be located convenient to the existing fuses. The shutdown procedure should inform the operator to check these fuses.

RESPONSE

The dedicated shutdown modification, as conceptually designed, will preclude the need for storing spare control power fuses in MCC cubicles, switchgear compartments, or distribution panels. Fires occurring in any critical areas, including the relay room, cable tunnel, control room, battery room, or air handling room will not cause control power fuses to be blown. The postulated circuit failures considered include wire-to-wire shorts, wire-to-ground shorts, and hot shorts. In all cases, the control circuitry is protected from these failures by isolation devices as shown on Figure 2 (see response to 8e).

Figure 2 depicts a typical control and isolation scheme for a motor-operated valve; a single lead is shown as a typical representation of all control wires. When operating in the normal mode (from control room), all wiring between the control room and the motor control center is buffered through the isolation circuits. The isolation devices provide 600-V isolation protection for the motor control center/switchgear circuits; consequently, no credible fire-induced events occurring in any of the critical fire zones is capable of blowing control power fuses at the motor control center. In addition, when operating in the normal mode, the dedicated control circuits (DS panel) are completely isolated from the motor control center by open contacts of the control transfer relay. These contacts will provide a minimum of 600-V isolation, so that no credible fire-induced failure of the DS circuits can affect the control power fuses when operating in the normal mode.

8h. Demonstrate that the manpower required to perform the shutdown functions using the procedures of (f) as well as to provide fire brigade members to fight the fire is available as required by the fire brigade technical specifications.

RESPONSE

A reevaluation of the manpower required to perform shutdown functions will be made when the dedicated shutdown system is complete. We do not anticipate that more manpower than is currently provided will be required.

8i. Demonstrate that adequate acceptance tests are performed. These should verify that: equipment operates from the local control station when the transfer or isolation switch is placed in the "local" position and that the equipment cannot be operated from the control room; and that equipment operates from the control room but cannot be operated at the local control station when the transfer or isolation switch is in the "remote" position.

RESPONSE

Following completion of the dedicated shutdown modification detailed design and acceptance test procedures will be developed. These procedures will be designed to fully demonstrate the dedicated shutdown capabilities as follows:

- Verify operability of shutdown-related equipment from both normal and dedicated shutdown control stations.
- Verify operability of interlocks between normal and dedicated shutdown controls.
- Verify operability of equipment status lights and annunciators.
- Verify operability of control and power transfer circuits.
- Verify operability of dedicated shutdown power sources.
- Verify operability and accuracy of dedicated shutdown instrumentation.

The acceptance test procedure(s) will generally be developed in accordance with the following typical outline:

1.0 Control transfer feature.

1.1 Plant shall be at cold shutdown conditions.

1.2 With control transfer switch in "remote," start and stop device from control room to verify normal control operation. Verify that operation of device controls on DS panel has no effect, and indicating lights on DS panel remain dark.

1.3 Place control transfer switch in "DS" position. Verify annunciation of DS control in control room. Start and stop device from DS panel to verify alternative control operation. Verify that operation of device controls on main control board has no effect, and indicating lights on main control board remain dark.

1.4 Return control transfer switch to "remote" position and repeat step 1.1. Device may now be declared operable.

8j. Technical Specifications of the surveillance requirements and limiting conditions for operation for that equipment not already covered by existing Tech. Specs. For example, if new isolation and control switches are added to a service water system, the existing Tech. Spec. surveillance requirements on the service water system should add a statement similar to the following:

"Every third pump test should also verify that the pump starts from the alternate shutdown station after moving all service water system isolation switches to the local control position."

RESPONSE

Appropriate amendments to our Technical Specifications will be submitted, if necessary, upon completion of the dedicated shutdown system.

8k. Demonstrate that the systems available are adequate to perform the necessary shutdown functions. The functions required should be based on previous analyses, if possible (e.g., in the FSAR), such as a loss of normal ac power or shutdown on a Group I isolation (BWR). The equipment required for the alternate capability should be the same or equivalent to that relied on in the above analysis.

RESPONSE

The operational functions required for safe shutdown and cooldown are identified on Table 1 in the response to Question 8(a). These functions correspond to those discussed in Section 14.1.12 of the R.E. Ginna Unit No. 1 FSAR. This section of the FSAR provides a tabulation of the functions required for shutdown following a loss of normal ac power; similar functions are required for shutdown following a postulated fire. It should be noted that the FSAR only contains references to the primary components required, while Table 1 addresses the equipment requirements (e.g., instrumentation, support systems) in greater detail.

The functions required for shutdown and cooldown, and the adequacy of the equipment provided to perform these functions are discussed below.

Monitor and Control Primary System Inventory and Pressure

Pressure and Inventory Monitoring

In order to monitor reactor coolant system inventory and pressure, one channel each of pressurizer level and RCS pressure instrumentation will be installed with indication on the DS panel. By providing a dedicated instrument channel for each parameter, primary coolant conditions can be adequately monitored. This instrumentation will be supported by dedicated process instrument lines, electrical cables, and power sources; the instrument lines, cables, and power sources will not be located in "critical" fire areas--control room complex, relay room, battery rooms, air handling room, and cable tunnel.

Borated water for primary system makeup will be supplied from the refueling water storage tank (RWST). The volume of water contained in the RWST at all times greatly exceeds the primary system makeup requirements under non-accident conditions. In addition, the refueling water boron concentration is adequate to maintain cold shutdown boration conditions.

Inventory Control and Pressure Control

The chemical and volume control system is provided with three charging pumps. As stated in Section 9.2.2 of the FFDSAR, one charging pump is adequate to provide full charging flow and the reactor coolant pump seal water supply during normal seal leakage. Consequently, the operability of one charging pump (1A) will be ensured by rerouting power and control circuits, and by providing a dedicated control location (DS panel).

In the event that the charging pumps are inoperable, the safety injection (SI) pumps can provide a viable alternative for primary system makeup as discussed in our March 19, 1981 submittal. Recognizing that the SI pump flow capacity greatly exceeds that required for normal makeup functions, only one SI pump will be provided for alternative shutdown operations. Controls and cables servicing SI pump 1A will be modified as described for charging pump 1A.

Operation of either charging pump 1A or SI pump 1A (using normal or dedicated control modes) is a viable means of increasing primary system pressure and inventory if required. Primary system pressure reduction, if required, will be achieved by venting through the main steam PORVs with pressure reduction resulting from cooldown through the secondary system. Operation of one main steam PORV is sufficient to provide the cooldown and pressure reduction function. Local manual operation will permit the use of either main steam PORV. Primary system pressure reduction may also be achieved by venting through the pressurizer PORVs although cooldown and pressure reduction through the secondary system is the preferred means. Operation of one pressurizer PORV is sufficient in this mode. Position indication for both PORVs will be provided on the DS panel and provisions will be made for local manual (air assisted) operation of either pressurizer PORV.

Remove Decay Heat By Means of Feedwater Addition to the Steam Generators, with Atmospheric Venting of Steam

Feedwater Supply

Section 14.1.12 of the FSAR describes an acceptable method of decay heat removal using the secondary system. The analysis of FSAR Section 14.1.12 demonstrates that operation of any one of the auxiliary feedwater pumps will supply sufficient feedwater for decay heat removal following a postulated loss of offsite power to all station auxiliaries. As discussed in the response to Question 8(a), power and control cables for the TAFWP steam supply valve will be rerouted to avoid "critical" fire areas.

In the event that the postulated fire occurs in the auxiliary feedwater pump area, the standby auxiliary feedwater (SBAFW) system is available to provide the required feedwater flow. Either of the two 100 percent SBAFW trains is capable of replacing the TAFWP function. To ensure that this backup capability will be available, all wiring associated with SBAFW train "A" will be rerouted as required to avoid areas occupied by wiring associated with the TAFWP.

Monitor Steam Generator Level

In order to utilize the secondary system for decay heat removal, at least one steam generator must be supplied with feedwater flow, and water level must be monitored. Dedicated wide-range level indicators will be provided for both steam generators on the DS panel.

Monitor Reactor Coolant System Temperature

In order to verify cooldown of the primary system, and to facilitate control of the cooldown rate, one wide range channel of RCS temperature instrumentation is required. The temperature display from this dedicated instrument channel will be located on the DS panel.

Vent Main Steam to Atmosphere

The main steam safety valves are capable of removing all reactor decay heat. However, to ensure a cooldown capability, the control/indication circuits associated with both PORVs will be modified as discussed in the response to Question 8(a). This modification will allow for monitoring of PORV position from the DS panel, with PORV operation accomplished by local manual control.

Decay Heat Removal to Cold Shutdown Conditions

In order to bring the unit to cold shutdown conditions, operation of at least one RHR equipment train (pump, heat exchanger, valve train) is required. As described in Section 9.3 of the FSAR each RHR train is capable of removing decay heat and operation of one train is adequate to achieve cold shutdown conditions (FSAR Section 9.3.1).

To ensure the operability of the RHR decay heat removal function, control and power cables associated with the train A pump and RHR area cooler will be selectively rerouted to avoid common areas occupied by wiring associated with the train B pump. As described in the response to Question 8(a), alternative controls for this pump will be provided on the DS panel. Power-actuated valves associated with train A will be deenergized to permit local manual control. In addition, a dedicated channel of RHR flow instrumentation will provide flow indication on the DS panel.

In the event that the RHR system is unavailable (e.g., fire in RHR pump pit), cooldown will be achieved using the secondary system in solid steam generator operation. This shutdown method has previously been described to the NRC in a letter dated July 27, 1978 and was accepted by the NRC in the Systematic Evaluation Program Safe Shutdown Systems Topic Review transmitted by letter dated November 14, 1980 from Dennis M. Crutchfield.

Verify That Reactor is Subcritical

Subcriticality will be verified by monitoring of the RCS boron concentration. By periodically verifying that the boron concentration is sufficiently high (e.g., cold shutdown boration conditions), subcriticality is assured. Drawing of reactor coolant samples is accomplished by use of one sample cooler heat exchanger and associated (manually operated) valve train.

Required Auxiliary Services

Component Cooling Water

As stated in Section 9.3 of the FSAR, one component cooling loop (pump, heat exchanger, valve train) is adequate to provide cooling for all shutdown-related components in the auxiliary building. The operability of one pump (1A) will be ensured by rerouting of power and control cables as required to avoid the critical fire zones identified in the response to Question 8(a). Alternative controls for this pump will be located on the DS panel.

Service Water

As described in the response to Question 8(a), one service water pump train will be modified to ensure its operability in the event of a fire in a critical fire zone. As described, the modification includes rerouting of control and power cables, installation of a fire barrier, and installation of alternative controls on the DS panel.

Section 9.6.3 of the FSAR contains a tabulation of the service water system capacities and cooling loads. Based upon this listing (as modified to address only shutdown-related loads, assuming no concurrent LOCA), it has been determined that one service water pump and valve train will provide adequate cooling capacity. Cooldown time will be longer than a normal shutdown. However, one pump will provide sufficient flow to achieve cold shutdown conditions.

480-Vac, 125-Vdc, 120-Vac Power Distribution

As described in the response to Question 8(a), the power system modifications include the following:

- Redistribution of shutdown-related loads onto new 480-V switchgear bus, normally fed from existing safety-related power division A.

- Establishment of dedicated dc and ac power sources, using dedicated 125-Vdc battery system and associated 125-Vdc/120-Vac inverter system. The dedicated 125 Vdc source will be used for operation of circuit breakers and motor starters; the 120-Vac source will provide power for shutdown-related instrumentation.

- Installation of diesel generator circuit breakers, and selective rerouting of control and power cables to provide an independent feed to the new (dedicated) shutdown 480-V switchgear bus.

The new 480-V switchgear section, 125-Vac, and 120-Vac supplies will be sized to support only the shutdown and cooldown-related loads as described in the response to Question 8(a). The adequacy of these power supplies will be supported by design calculations. When operating in the shutdown/cooldown modes, most loads not necessary for shutdown following a fire will be disconnected from these sources.

81. Demonstrate that repair procedures for cold shutdown systems are developed and material for repairs is maintained on site.

RESPONSE

As described in the response to Question 8(a), the objective of the dedicated shutdown modification is to ensure the operability of those systems and components required to achieve and maintain cold shutdown conditions. Consequently, the rerouting of cables, installation of dedicated controls and power supplies, and other modifications eliminate the need to repair any equipment following a fire. In the event of a severe fire in any single fire zone, no more than one train of redundant or dedicated shutdown-related equipment will be damaged.

ENCLOSURE 2

NRC Position

1. Section III.G of Appendix R to 10 CFR Part 50 requires cabling for or associated with redundant safe shutdown systems necessary to achieve and maintain hot shutdown conditions be separated by fire barriers having a three-hour fire rating or equivalent protection (see Section III.G.2 of Appendix R). Therefore, if option III.G.3 is chosen for the protection of shutdown capability cabling required for or associated with the alternative method of hot shutdown for each fire area, must be physically separated by the equivalent of a three-hour rated fire barrier from the fire area.

   In evaluating alternative shutdown methods, associated circuits are circuits that could prevent operation or cause maloperation of the alternative train which is used to achieve and maintain hot shutdown condition due to fire induced hot shorts, open circuits or shorts to ground.

   Safety related and non-safety related cables that are associated with the equipment and cables of the alternative, or dedicated method of shutdown are those that have a separation from the fire area less than that required by Section III.G.2 of Appendix R to 10 CFR 50 and have either (1) a common power source with the alternate shutdown equipment and the power source is not electrically protected from the post-fire shutdown circuit of concern by coordinated circuit breakers, fuses or similar devices, (2) a connection to circuits of equipment whose spurious operation will adversely affect the shutdown capability, e.g., RHR/RCS Isolation Valves, or (3) a common enclosure, e.g., raceway, panel, junction box, with alternative shutdown cables and are not electrically protected from the post-fire shutdown circuits of concern by circuit breakers, fuses or similar devices.

For each fire area where an alternative or dedicated shutdown method, in accordance with Section III.G.3 of Appendix R to 10 CFR Part 50, is provided by proposed modifications, the following information is required to demonstrate that associated circuits will not prevent operation or cause maloperation of the alternative or dedicated shutdown method:

A. Provide a table that lists all equipment including instrumentation and support system equipment that are required by the alternative or dedicated method of achieving and maintaining hot shutdown.

RESPONSE

This information is enclosed in this submittal as Table 1 in the response to Enclosure 1, Question 8(a), which provides a listing of the functions and components required for achieving and maintaining cold shutdown using the dedicated shutdown mode. For hot shutdown operation only, the following functions and components would be deleted from Table 1:

- Decay heat removal to cold shutdown--RHR system
- Auxiliary services--Component cooling

B. For each alternative shutdown equipment listed in 1.A above, provide a table that lists the essential cables (instrumentation, control and power) that are located in the fire area.

RESPONSE

As stated in the response to Enclosure 1, Question 8(b), the dedicated shutdown modification is presently at the conceptual stage, and detailed conduit/cable routing has not yet been developed. However, the principal zones that will be occupied by (rerouted) dedicated shutdown cables have been defined, and are identified on Table 2, Normal and Alternative Shutdown Cables by Fire Zone.

The fire zones occupied by circuits presently serving components that will be used for dedicated shutdown operation are identified on Table 3. It should be noted that rerouting of selected circuits, reconfiguration of power supplies and other plant modifications will eliminate the exposure to common high-hazard fire areas or will provide adequate spatial separation or rated fire barriers between cables serving normal and alternative devices.
For clarity of presentation, the fire zones have been consolidated into fire areas; i.e., zones ABMM, ABMW, ABME are not separated by 3-hour-rated fire barriers and have been consolidated into one "area", ABM (Auxiliary Building Mezzaine Floor). Other zones have been consolidated in a similar manner and are described in Appendix 1 of this submittal.

SHUTDOWN ONENT	PRINCIPAL FIRE AREAS																						
	ABB	ABM	ABO	ABRH	AHR	BRIA	BRIB	CC	CT	CV	EGIA	EGIB	EGAV	EGBV	IBB	IBM	RR	SAF	SBB	SHM	SHOP	TBB	TBM
TRUMENTATION																							
		I			I			I	I	I					I		I						
EVEL	I	I			I			I	I	I					I		I						
URE	I				I			I	I	I					I		I						
TOR LEVEL		I			I			I	I	I					I		I						I
INE PRESSURE					I			I	I						I	I	I					I	
	I	I			I			I	I								I						
STORAGE TANK LEVEL					I			I	I						I		I		I				
OW								I	I								I						
IP FLOW	I	I			I			I	I								I						
FLOW	I	I			I			I	I								I						
RY AND PRESSURE																							
MP 1A AND VALVE	P,C	P,C	P,C		C			C	C	C,I					C,I		C						
OOM COOLER		P,C	P,C																				
CTION PUMP 1A AND	P	P,C	P,C		C			C	C	C,I							C						
CTION PUMP COOLING	P,C	P,C	P,C																				
PORV CONTROL INDICATION	C,I	C,I	C		C,I			C,I	C,I	C,I					I		C,I						
REMOVAL																							
VEN AUXILIARY FEED- AND VALVE TRAIN		C	C		C	C	C	C	C						C	C	C					C	
IXILIARY FEEDWATER D VALVE TRAIN	C	P,C			C			C	C								C	P,C					
A AND VALVE TRAIN	P	P,C	P,C		C			C	C						C		C						
1 LINE PORVs					C	C	C	C	C						C	C	C					C	
SERVICES																							
COOLING PUMP 1A TRAIN		P,C			C			C	C								C						
TER PUMP 1A AND IN		P,C	P,C		C		C	C	C		C	C	C	C	C		C			P,C	P,C	C	C
R DIVISION A		P,C	P					C	C		P		P				C						
LATED 120-VAC SYSTEM		P				P		P	P														
LATED 125-VDC SYSTEM		P	P			P		P	P														
IERATOR 1A		C	C		C	P	C,I	C,I	C,I		P,C,I		P,C,I	P,C,I			C,I				C		

ER CIRCUIT
TROL CIRCUIT
RUMENTATION
CUIT

2. THIS TABLE REFLECTS EXISTING CABLE ROUTING, AND IS NOT REPRESENTATIVE OF CABLE ROUTING THAT WILL EXIST AFTER COMPLETION OF DEDICATED SHUTDOWN MODIFICATION DESIGN AND IMPLEMENTATION.

R. E. GINNA NUCLEAR STATION
DEDICATED SHUTDOWN COMPONENTS
EXISTING CABLE ROUTING BY FIRE AREAS

TABLE 3

C. Provide a table that lists safety related and non-safety related cables associated with the equipment and cables constituting the alternative or dedicated method of shut down that are located in the fire area.

RESPONSE

Circuits that are associated with dedicated shutdown cables, power sources, or equipment are presently located in most of the fire areas identified on Table 3. These circuits are predominantly located in the high-fire-hazard areas containing high density cable routing, particularly in cable trays. These areas include, but are not limited to:

- o Air handling room (AHR)
- o Battery rooms (BRIA, BRIB)
- o Cable tunnel (CTEL, CTEW, CTNS)
- o Containment electrical penetration areas (CVMW, CVME, IBBE, ABMW)
- o Relay room (RR)
- o Control room (CC)

Because of the high density of cables in these areas, and the complexity of cable routing, no attempt will be made to selectively separate normal shutdown circuits from their associated circuits. As described in the response to 2(D) the dedicated shutdown circuits will be routed outside these areas, in separate conduit, with appropriate electrical isolation at any dedicated shutdown/normal shutdown circuit interfaces.

By establishing complete separation and isolation in this manner, those cables that are presently associated with dedicated shutdown equipment will remain in place, but will no longer be classified as associated circuits.

D. Show that fire-induced failures of the cables listed in B and C above will not prevent operation or cause maloperation of the alternative or dedicated shutdown method.

RESPONSE

Any fire-induced failures of normal control and power circuits or circuits associated with dedicated shutdown cables, power supplies, or equipment will not adversely affect dedicated shutdown operation, as a result of the following design criteria:

1. When operating in the dedicated shutdown mode, essential components will utilize ac and dc power supplies that are independent of the existing distribution systems. Only circuits required for safe-shutdown operation will interface with these power sources; failures of any circuits associated with the normal distribution system will have no effect on the dedicated shutdown circuits.

2. Circuits required for dedicated shutdown operation will be rerouted as indicated to avoid high-hazard fire zones occupied by normal shutdown circuits. Circuits will be rerouted in conduit, which will contain only dedicated-shutdown circuits. Consequently, the dedicated shutdown circuits will be routed independent of all other plant circuits.

3. All interfaces between normal and dedicated shutdown circuits will be provided with electrical isolation that will meet, as a minimum, the requirements of Regulatory Guide 1.75. The isolation concepts are described in the response to Question 8(e) of Enclosure 1.

E. For each cable listed in 1.B above, provide detailed electrical schematic drawings that show how each cable is isolated from the fire area.

RESPONSE

The dedicated shutdown system modification is not yet at the detailed design stage, consequently, detailed electrical schematic drawings are not available. However, the isolation concepts that will be applied for the dedicated shutdown cables are described in the response to Question 8(e) of Enclosure 1.

The conceptual schematic/block diagram illustrating the isolation concepts is presented as Figure 2 (see response to question 8(e) of Enclosure 1). This diagram identifies the principal isolation components and their locations (i.e., critical/non-critical fire zones, auxiliary building/technical support center). Although Figure 2 only illustrates the isolation scheme for a motor-operated valve, the same concepts will be applied to protect dedicated shutdown circuits for pumps, circuit breakers, and other components, as required.

2. The residual heat removal system is generally a low pressure system that interfaces with the high pressure primary coolant system. To preclude a LOCA through this interface, we require compliance with the recommendations of Branch Technical Position RSB 5-1. Thus, this interface most likely consists of two redundant and independent motor-operated valves. These two motor-operated valves and their associated cable may be subject to a single fire hazard. It is our concern that this single fire could cause the two valves to open resulting in a fire-initiated LOCA through the subject high-low pressure interface. To assure that this interface and other high-low pressure interfaces are adequately protected from the effects of a single fire, we require the following information:

A. Identify each high-low pressure interface that uses redundant electrically controlled devices (such as two series motor operated valves) to isolate or preclude rupture of any primary coolant boundary.

RESPONSE

Three interfaces with the primary coolant system utilize redundant electrically controlled devices to isolate the pressure boundary:

1. Residual heat removal system suction and injection lines: valves V-700/V-701, V-720/V-721 are motor-operated valve pairs (in series).

2. Pressurizer PORVs and associated motor-operated block valves: PCV-430/V-516, PCV-431C/V-515

3. Chemical and volume control system letdown line.

B. Identify the device's essential cabling (power and control) and describe the cable routing (by fire area) from source to termination.

RESPONSE

1. Residual Heat Removal System - Valves V-700, 701, 720, 721

The control and power circuits for the referenced valves are listed below; the fire zones occupied by the circuits are shown on Table 4.

Valve		Essential Circuits
V-700	Control	C-722, 723, 724, 725, 726
	Power	C-720, 721
V-701	Control	C-726, 1089, 1090, 1091, 1092
	Power	C-1087, 1088
V-720	Control	C-715, 716, 717
	Power	C-713, 714
V-721	Control	C-1081, 1082, 1083, 1084
	Power	C-1079, 1080

2. Pressurizer PORVs PCV-430, PCV-431C and Block Valves V-516, V-515

The control and power circuits for the PORVs and block valves are listed below; the fire zones occupied by the circuits are listed on Table 5.

Valve		Essential Circuits
V-515	Control	C-692, 693, 694
	Power	C-690, 691
V-431C	Control	R-274, 275, 277, 279, 279A, 279B, 999, 1000, 1001, 1002, 1008, 1082, 1083, 1089, 1094, 1099, 1100
	Instrumentation	R-997, 998, 1079, 1080, 1086, 1087, 1088, 1090, 1090A, 1090B, 1091, 1092, 1093, 1095, 1095A, 1095B, 1096, 1096A, 1097, 1100A, 1100B
V-516	Control	C-1058, 1059, 1060
	Power	C-1056, C-1057
V-430	Control	R-274, 275, 276, 278, 278A, 278B, 953, 954, 955, 956, 960, 961, 1077
	Instrumentation	R-951, 952, 1074, 1075, 1078

3. Letdown Orifice Isolation Valves V-200A, V-200B, V-202 and Letdown Line Valve V-371

The control and power circuits for the letdown valves are listed below; the fire zones occupied by the circuits are listed on Table 6.

Valve		Essential Circuits
V-200A	Control	R-500, 504, 506, 507, 507A, 509, 515
	Power	R-498, 499
V-200B	Control	R-500, 504, 508, 512, 513, 513A
	Power	R-498
V-202	Control	R-500, 501, 503, 510, 516, 517, 518
	Power	R-498
V-371	Control	R-567, 567A, 567B, 568
	Instrumentation	R-569, 570, 571

TABLE 4

ROUTING OF ESSENTIAL CIRCUITS BY FIRE ZONE;
RHR VALVES V-700, V-701, V-720, V-721

	Redundant (Series) Valves		Redundant (Series) Valves	
Fire Zone	V-700	V-701	V-720	V-721
ABBN				P
ABMM	P,C	MCC-ID	P,C	MCC-ID
ABMW		C	P,C	P,C
ABON	MCC-IC		MCC-IC	
AHR	C	C	C	C
CTEL	P,C	P,C	C	C
CTEW	C	C	C	C
CTNS	P,C	P,C	C	C
CVBE	P,C	Valve	Valve	Valve
CVBW	Valve			
CVME	P,C	P,C	P,C	P,C
CVMW	P,C	P,C		
IBBE	P,C	P		
RR	C	C	C	C
CC	C	C	C	C

Notes

1. Fire zones as described in the R.E. Ginna Safe-Shutdown Fire Study, dated December 28, 1979 and in Appendix 1 of this submittal.

2. P = Power circuit, C = Control circuit, I = Instrumentation circuit.

TABLE 5

ROUTING OF ESSENTIAL CIRCUITS BY FIRE ZONE;
PORVs PCV-430, PVC-431C, BLOCK VALVES V-515, V-516

	Redundant (Series) Valves		Redundant (Series) Valves		
Fire Zone	V-515	PCV-431C	V-516	PCV-430	Comments
ABBN			P		
ABMM	P,C	C,I	MCC-ID	C	
ABMW	P,C	C,I	P,C	C	
ABON	MCC-IC				
AHR	C	C,I	C	C,I	
CTEL	C	C,I	C	C,I	
CTEW	C	C,I	C	C,I	
CTNS	C	C,I	C	C	
CVBE		I		I	
CVME	Valve	Valve	Valve	Valve	
CVOE	P,C	C	P,C	C	
IBBE		I	I		
RR	C	C,I	C	C,I	
CC	C	C,I	C	C,I	Note 3

Notes

1. Fire zones as described in the R.E. Ginna Safe-Shutdown Fire Study, dated December 28, 1979 and in Appendix 1 of this submittal.

2. C = Control circuit, I = Instrumentation circuit P = Power circuit.

3. Control board provides 125-Vdc power source for PORV actuator circuits.

TABLE 6

ROUTING OF ESSENTIAL CIRCUITS BY FIRE ZONE
LETDOWN VALVES V-200A, V-200B, V-202, V-371

Fire Zone	V-200A	V-200B	V-202	V-371
ABBE	P,C		C	
ABBN	C	P,C	P,C	
ABBW				C,I
ABMM	P,C	P,C	P,C	C
ABMW	C	C	C	
AHR	P,C	P,C	P,C	C
BR1A	P	P	P	
CTEL	P,C	P,C	P,C	C
CTEW	P,C	P,C	P,C	C
CTNS	P,C	P,C	P,C	C
CVBE	C	C	C	
CVME	C	C	C	
RR	C	C	C	C,I
CC	C	C	C	C,I

Notes

1. Fire zones as described in the R.E. Ginna Safe-Shutdown Fire Study, dated December 28, 1979 and in Appendix 1 of this submittal.

2. P = Power circuit, C = Control circuit, I = Instrumentation circuit.

C. Identify each location where the identified cables are separated by less than a wall having a three-hour fire rating from cables for the redundant device.

RESPONSE

By examining Tables 4 and 5, it will be noted that cables associated with the redundant RHR, pressurizer PORV, and letdown valve pairs are routed through a number of common fire zones. Where redundant cables are routed through common zones, they are generally not separated by a three-hour-rated fire barrier. The areas of exposure to common fire hazards for each redundant valve pair are summarized as follows:

V-700, V-701:	ABMM, AHR, CTEL, CTEW, CTNS, CVBE, CVME, CVMW, IBBE, RR, CC
V-720, V-721:	ABMM, ABMW, AHR, CTEL, CTEW, CTNS, CVBE, CVME, RR, CC
V-515, PCV-431C:	ABMM, ABMW, AHR, CTEL, CTEW, CTNS, CVME, CVOE, RR, CC
V-516, PCV-430:	ABMM, ABMW, AHR, CTEL, CTEW, CTNS, CVME, CVOE, RR, CC
V-200A, V-200B, V-202:	ABBE, ABBN, ABMM, ABMW, AHR, BR1A, CTEL, CTEW, CTNS, CVBE, CVME, RR, CC

D. For the areas identified in item 2c above (if any), provide the bases and justification as to the acceptability of the existing design or any proposed modifications.

RESPONSE

1. RHR Valves V-700, 701, 720, 721

The RHR function is not required to achieve hot shutdown; consequently, there is no requirement (based on time response restrictions) to control the RHR system from the dedicated shutdown control panel. The RHR may be aligned using manual operation of valves (V-700, 701, 720, 721) that are normally operated using electrical or pneumatic actuators. In addition, if the RHR System is unavailable, cooldown will be achieved using the secondary system in solid steam generator operation, as described in the response to Question 8 (k) of Enclosure 1.

It is recognized that rerouting of redundant circuits to avoid common fire zones or installation of barriers will not provide the required separation in all areas. The zone containing the valves will necessarily remain a vulnerable location, because of the physical proximity of the redundant valves, exposing cables, and valve actuators to a common fire hazard. As a result, the control circuits for one valve in each pair will be modified so that ac power is removed under normal plant operating conditions. In addition, all four valves will be provided with remote status indication on the dedicated shutdown control panel. By removing ac power, no postulated fire-induced circuit faults will cause both normally closed valves in either train to spuriously open.

2. <u>Pressurizer PORVs and Block Valves</u> (V-515, PCV-431C, V-516, PCV-430)

The pressurizer relief block valves (V-515, V-516) are operated in a normally open, fail-as-is mode. In the event that the associated PORV is spuriously opened by a fire-induced event, the block valve would require both ac power and dc control power to close the relief path. The physical proximity of the valves, and exposure (of cables and actuators) to common fire hazards makes remote manual operation unreliable in the event of a fire in a critical fire zone. In addition, the motor-operated block valves are generally inaccessible for direct manual operation. To ensure that both pressurizer relief paths can be secured when required, the following modifications to the PORV actuation circuits will be made:

- Provide remote switches (at DS panel) to permit dc control power to be disconnected from the PORVs if required. Removal of dc power and/or loss of air supply will cause valves to fail closed.

- Reroute critical actuation circuits in conduit (downstream of disconnect switches) as required to avoid exposure to potential fire-induced "hot shorts" to other circuits.

- Provide remote status (position) indication for both PORVs on the DS panel.

- Provide for local manual actuation of the PORVS for primary system pressure reduction, if required. These actuation circuits will only be activated through a control transfer switch, and will be normally deenergized. Consequently, they will <u>not</u> introduce an additional means of fire-induced PORV actuation.

3. <u>Letdown Orifice Valves V-200A, V-200B, V-202, and Letdown Line Valve V-371</u>

The letdown valves are designed to fail closed on loss of instrument air or DC control power. However, in the event of a fire in a critical fire zone, any or all of these valves may be spuriously actuated. If one or more of the letdown orifice isolation valves (V-200A, 200B, 202) is opened while V-371 remains closed, letdown may occur through RV-203. To ensure that the letdown orifice isolation valves can be secured, the following modifications to the V-200A, V-200B, and V-202 actuation circuits will be made:

- Provide remote switches (at DS panel) to permit dc control power to be disconnected from the valves if required.

- Reroute critical actuation circuits in conduit (downstream of disconnect switches) as required to avoid exposure to potential fire-induced "hot shorts" to other circuits.

- Provide remote status (position) indication for all three valves on the DS panel.

APPENDIX 1

FIRE AREA/FIRE ZONE ACRONYMS
(As described in R. E. Ginna Safe-Shutdown Fire Study dated December 1979)

Fire Area	Fire Zone	Description
ABB		Auxiliary Building Basement
	ABBE	Auxiliary Building Basement-East
	ABBN	Auxiliary Building Basement-North
	ABBS	Auxiliary Building Basement-South
	ABBW	Auxiliary Building Basement-West
ABM		Auxiliary Building Mezzanine
	ABME	Auxiliary Building Mezzanine-East
	ABMM	Auxiliary Building Mezzanine-Midsection
	ABMW	Auxiliary Building Mezzanine-West
ABO		Auxiliary Building Operating Floor
	ABON	Auxiliary Building Operating Floor-North
	ABOS	Auxiliary Building Operating Floor-South
	ABOW	Auxiliary Building Operating Floor-West
	ABRH	Auxiliary Building RHR Room
	AHR	Air Handling Room
	BR1A	Battery Room 1A
	BR1B	Battery Room 1B
CT		Cable Tunnel
	CTEL	Cable Tunnel-Elbow
	CTEW	Cable Tunnel-East-West
	CTNS	Cable Tunnel-North-South
CV		Containment Vessel
	EG1A	Diesel Generator Room 1A
	EG1B	Diesel Generator Room 1B
	EGAV	Diesel Generator Vault 1A
	EGBV	Diesel Generator Vault 1B
IBB		Intermediate Building Basement
	IBBE	Intermediate Building Basement-East
	IBBN	Intermediate Building Basement-North
	IBBS	Intermediate Building Basement-South
IBM		Intermediate Building Mezzanine
	IBMN	Intermediate Building Mezzanine-North
	IBMS	Intermediate Building Mezzanine-South
IBO		Intermediate Building Operating Floor
	IBON	Intermediate Building Operating Floor-North
	IBOS	Intermediate Building Operating Floor-South

Fire Area	Fire Zone	Description
SAF		Standby Auxiliary Feedwater Room
SHB		Screen House-Basement
SHM		Screen House-Mezzanine
SHO		Screen House-Operating Floor
	SHOB	Screen House-Operating Floor-Boiler
	SHOE	Screen House-Operating Floor-East
	SHOP	Screen House-Operating Floor-Pumps
	SHOS	Screen House-Operating Floor-Screens
RR		Relay Room
CC		Control Room
TBB		Turbine Building Basement
	TBBE	Turbine Building Basement-East
	TBBM	Turbine Building Basement-Midsection
	TBBW	Turbine Building Basement-West
TBM		Turbine Building Mezzanine
	TBME	Turbine Building Mezzanine-East
	TBMM	Turbine Building Mezzanine-Midsection
	TBMW	Turbine Building Mezzanine-West