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SUBJECT: Forwards Rev 2 to "App R Alternative Shutdown Sys." re proposals to provide safe cold shutdown capability following fire anywhere in plant.

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January 16, 1985

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

Subject: Appendix R Alternative Shutdown System
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Zwolinski:

Rochester Gas and Electric submitted a report titled, "Appendix R Alternative Shutdown System on January 16, 1984. The report described proposals to provide safe cold shutdown capability following a fire anywhere in the plant as required by 10 CFR 50 Appendix R. During the review process, NRC Staff members requested that certain changes be made to reflect current NRC positions. Revision 1 of the report was submitted October 4, 1984.

Discussion with another reviewer has resulted in a request for additional revisions to the report. The enclosed revised pages reflect the agreed upon changes. Please insert these Revision 2 pages into the report book as directed in the enclosure.

As in the past, RG&E remains anxious to receive written NRC approval of the proposed Appendix R compliance plans. Because RG&E is reluctant to continue a large commitment of resources without your written concurrence, a delay in completing the staff Safety Evaluation Report may adversely affect our capability to complete the proposed modifications in accordance with the previously established schedule. RG&E staff will remain available at your convenience to respond to any further questions as necessary in completing the SER.

Very truly yours,

John E. Maier

John E. Maier

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Rochester Gas and Electric

Appendix R Alternative Shutdown System

Revision 2

Update the report to become Revision 2 by making the following changes:

Remove	Add
binder spline and front and back inserts	binder spline and front and back inserts
page 3-18	page 3-18, Revision 2
3-19	3-19, Revision 2
3-20	3-20, Revision 2
4-7	4-7, Revision 2
4-8	4-8, Revision 2
4-13	4-13, Revision 2
4-15	4-15, Revision 2
4-18	4-18, Revision 2
6-11	6-11, Revision 2
6-13	6-13, Revision 2
	6-13a, Revision 2
6-19	6-19, Revision 2
Table 6-3, page 2	Table 6-3, page 2, Revision 2
7-24	7-24, Revision 2

Insert this instruction sheet in front of the Table of Contents.

The only requirement is that sufficient time must be available to restore the affected safe shutdown system function prior to the occurrence of an unrecoverable plant condition. For this analysis, a time-line/manpower concept is utilized to establish that sufficient time is available for restoration of the safe shutdown system function. The resulting shutdown activities chart shows the number of personnel involved in performing each safe shutdown function and the time required to perform those functions. This chart is explained more fully and shown in Section 6.

All operators and fire brigade members are drawn from on-site personnel with the staffing level specified by plant technical specifications. Although a recall procedure can be credited with increasing the number of operators available shortly after a fire, this analysis does not take credit for a recall procedure until the first hour after the fire. All hot shutdown activities can be completed by the on-site personnel.

3.3.2.7 Off-site Power

The analysis verifies that all safe shutdown systems and components which require electrical power are powered by on-site power sources. The post-fire survivability of on-site power sources is verified as part of the safe shutdown system review.

Off-site power is considered a potential initiator of spurious component operation. The analysis verifies that the spurious re-introduction of off-site power will not have a

detrimental effect on safe shutdown capability. In summary, off-site power is not credited with providing any beneficial effects for 72 hours, while it is assumed not to adversely affect safe shutdown capability.

3.3.2.8 Repairs

The NRC Staff position regarding repair of hot and cold shutdown systems or components states, in part, that "all manual operations must be achieved prior to the fire or fire suppressant-induced maloperation reaching an unrecoverable plant condition." This position is contained in an NRC memorandum.[1] The analytical approach used for the Ginna alternative shutdown review is consistent with this NRC Staff position.

The analysis assumes the removal of a limited number of fuses for isolation of potential spurious operations caused by control circuit fire damage. To preclude nonsafe shutdown loads from becoming faulted and placing an unnecessary load on the on-site power source, the 480V switchgear buses supplied by emergency diesel generator 1A are manually stripped of all nonsafe shutdown loads. The control circuits for these devices are then deenergized by pulling control power fuse holders for each switchgear cubicle. The control power fuses are centrally located in a separate electrical box at each respective bus. This box contains only control power fuse holders and fuses. The operator

1/ Memorandum to Mr. R.H. Vollmer (NRR/DE) from Dr. R.J. Mattson (NRR/DSI), SUBJECT: Position Statement on Allowable Repairs for Alternative Shutdown and the Appendix R Requirement for Time Required to Achieve Cold Shutdown, dated July 2, 1982.

will not be required to differentiate between fuses. The procedure will require the removal of all fuse and fuse holder combinations within the enclosure (approximately 10 on bus 18 and 15 on bus 14) with one exception addressed below. This will assure that all potential spurious actuations are defeated with one operator activity that can be completed in a minute or less. Any safe shutdown load on these buses (except the charging pump) will then be reloaded by manually (control circuit deenergized) closing the required switchgear. Figure 3-15 shows the safe shutdown loads associated with diesel generator 1A. The control circuit for the charging pump will be energized since remote operation from the Charging Pump Room is assumed. A separate dc control power circuit with fuses in a separate location or with special retaining features and marking in the existing panel will be employed so that this circuit can be energized with the transfer switch when required.

The analysis addresses the issue of post-72 hour maintenance of cold shutdown in the following manner:

(1) Demonstrates the ability to maintain on-site power sources significantly longer than 72 hours; and

Decay Heat Removal - ABO

A fire on this level has the potential for damaging 480V ac bus 14 and MCC 1C. Motor-driven AFW pump 1A and standby AFW pump 1C would be rendered inoperable. Hot shutdown decay heat removal capability on this level consists of operating standby AFW pump 1D located in SAF from the Control Room. Power to the pump is supplied from bus 16, which is supplied from EDG 1B. DC control power is supplied through the Auxiliary Building dc distribution panel (ABDP) 1B (in Fire Zone ABM) supplied from main dc distribution panel 1B located in Fire Area BR1B. The standby AFW pump and associated discharge valves can be remotely or manually operated.

Cold shutdown decay heat removal capability consists of the RHR system in its normal shutdown mode. Portions of the RHR system powered off bus 14 may be damaged. However, use of undamaged RHR system components may be used to achieve cold shutdown within 72 hours.

Reactor Pressure Control - ABO

Pressure control is ensured by the pressurizer safety valves and by maintenance of makeup capability as described above.

Support Systems - ABO

Service water cooling to the emergency diesel generator 1B is unaffected by a fire in this area. Component cooling water (CCW) pumps 1A and 1B may be damaged by a fire. This may cause a loss of CCW supply normally used for cold shutdown. If the CCW system is damaged by a fire, water-solid steam generator operation may be employed. This procedure was described in

detail in a submittal previously transmitted to the Staff and approved in a Staff-issued SER (see references in 3.5.3.6). Although not required because of the water-solid steam generator cooldown capability, a spare pump, replacement power leads and a repair procedure are maintained on site to provide greater operational versatility. No credit is taken in this analysis, however, for this added capability.

Process Monitoring - ABO

CCW flow local indicators can be damaged by a fire in this area. Adequate time exists to install a new flow indicator following a fire.

4.5.1.2 Zone IBN - Intermediate Building North

Redundant safe shutdown equipment associated with the same function is not located in fire zones of the same fire area.

Reactor Makeup Capability - IBN

A fire in this area does not affect train B reactor makeup capability.

Reactor Reactivity Control - IBN

Reactivity control is not affected by a fire in this area.

Decay Heat Removal - IBN

A fire in this area may damage the turbine-driven AFW pump and its associated control circuitry. Decay heat removal capability is provided by normal operation of either standby AFW pump from the Control Room.

Reactor Pressure Control - IBN

Pressure control is ensured by automatic operation of pressurizer safety valves and by maintenance of makeup capability as described above.

Cold shutdown decay heat removal may be achieved by use of undamaged portions of the RHR system or by using the previously approved water-solid steam generator method. This analysis assumes the water-solid steam generator method will be used and no credit is taken for repair of the RHR system. Adequate time exists, however, either to implement a procedure to repair RHR pump 1A power feeds damaged by a fire and operate the RHR pump or to use the water-solid steam generator method.

Reactor Pressure Control - ABM

Pressure control is ensured by automatic operation of pressurizer safety valves and by maintenance of makeup capability as described above.

Support Systems - ABM

Service water cooling to the emergency diesel generator 1A is unaffected by a fire in this area. Component cooling water pump 1A power and control circuits may be affected by a fire in this area. Use of the previously approved water-solid steam generator cooldown method provides cold shutdown capability. In addition, the post-fire replacement of fire-damaged CCW pump 1A power feeds could be accomplished and, together with the local operation of the bus 14 feeder breaker to CCW pump 1A, could also provide component cooling water for cold shutdown.

Process Monitoring - ABM

Fire on this level may cause loss of:

(1) Charging flow indication;

(2) Primary pressure transmitter loop PT-420;

(3) Pressurizer level transmitter loop LT-426; and

(4) RWST level indication.

Reactor Reactivity Control - ABB

Reactivity control is ensured by maintenance of makeup capability as described above.

Decay Heat Removal - ABB

A fire on this level does not impair hot shutdown decay heat removal capability. The preferred decay heat removal method consists of using the turbine-driven AFW pump (in Fire Zone IBN) controlled in the Control Room.

Cold shutdown decay heat removal may be impaired by a fire in the RHR pump pits, damaging both pumps. A less severe fire, one that damages only power feeds, may be mitigated by the post-fire repair and replacement of the feeds, although no credit is taken in this analysis for this option. The water-solid steam generator decay heat removal method can also be used and provides cold shutdown capability. This approach was described in an RG&E letter to the NRC Staff[1] and was subsequently accepted by the Staff.[2]

1/ Letter dated July 28, 1982, J.E. Maier (RGE) to D.M. Crutchfield (NRC), SUBJECT: Fire Protection Rule - 10 CFR 50.48(c)(5) - Alternate Safe Shutdown - Section III.G.3 of Appendix R to 10 CFR 50 (SEP Topic IX-6).

2/ Letter dated April 11, 1983, D.M. Crutchfield (NRC) to J.E. Maier (RGE), SUBJECT: Fire Protection SER - R.E. Ginna Nuclear Power Plant.

more after the fire event. An intertie exists between the TSC battery charger (supplied from the TSC diesel generator) and main fuse cabinet 1B (train B dc power). Use of this existing intertie will provide for long-term operation of the turbine-driven AFW pump.

Manual operation of discharge valves V-3996 and V-4297 (or V-4298) will then be accomplished to permit AFW flow to the appropriate steam generator. As before, power will be isolated or instrument air isolated and bled off before manual operation is attempted.

Long-term decay heat removal will be accomplished by use of the RHR system. RHR pump control circuits may be damaged by a fire in the area. Adequate time exists to either repair damaged control circuits or to locally control RHR pump breakers. This analysis assumes that repairs will not be made and that the breakers will be operated locally.

Reactor Pressure Control - CT

Pressure control is ensured by the pressurizer safety valves and by maintenance of makeup capability as described above.

Support Systems - CT

Service water pump control circuits from the MCB and buses 17 and 18 are located in this area. SW transfer switches are located in this area. Service water supply may be degraded. Adequate time exists to line up the underground yard fire water system to supply EDG cooling. The turbine-driven AFW system, taking suction from the CST, will provide decay heat removal for more than two hours. Before the CST is depleted, the underground

Continued operation of the EDG depends on the transfer of fuel oil from the supply tank to the day tank. Protection of the dc control and ac power feeds to MCC 1H will be provided to assure operability of the transfer pump and a long-term supply of fuel oil.

Certain fire scenarios may cause loss of service water cooling to the EDGs. A fire hose connection on each EDG will be used to supply cooling water from the underground yard fire water supply. The tested flow from one hydrant connection is approximately 800 gpm. Each EDG requires approximately 320 gpm for normal cooling. Adequate time exists for the operator to make this connection prior to starting the appropriate EDG.

6.2.2.4 Miscellaneous Valve Locations (Support Stations)

Various valves must be checked and verified closed in order to ensure primary system integrity and to preclude spurious operation of these valves affecting the achievement and maintenance of safe shutdown. These valves are listed in Table 6-1 along with the reason for ensuring closure. Other valves, located in the specific safe shutdown flow path for a particular safe shutdown system, are verified open or closed by the operator before the operation of the system. These valves have been verified to be manually operable and are not listed in Table 3-1. All valves that must be verified open or closed, either to ensure normal system operation or to prevent a spurious operation, will have their associated power breakers (ac or dc) shut off prior to the manual operation.

Second, the re-establishment of safe shutdown equipment operation, control, and monitoring functions will be ensured by providing alternative control power, as necessary. This will be accomplished using existing protected power supplies with new switches or breakers. Figure 6-1 illustrates how protection of the power supplies will be provided. One fuse is normally switched out of the control circuit and therefore not susceptible to damage until the power switch (PS) has been put in the LOCAL position. Switch PS will not be placed in the LOCAL position until switch 43/* has been placed in the LOCAL position, thereby isolating the potentially fire damaged circuit prior to repowering the alternative shutdown circuit. Figure 6-1 is provided as an example of this modification. However, all circuits required for alternative shutdown operation at R.E. Ginna will incorporate this feature. The alternative shutdown procedures will incorporate appropriate precautions and amplifications to assure that the new PS switch will not be repositioned until the potentially damaged control circuit is isolated by the 43/* switch. Figure 6-2 does not show this feature, however, it will be included in the final design.

Once the operability of an alternative control station is ensured by the protective features described above, the specific features of each station can be used to control the safe shutdown systems and components necessary to achieve safe shutdown. Table 6-2 lists the safe shutdown systems selected for alternative shutdown, the applicable alternative shutdown control stations and their locations, and the alternative shutdown functions served by each system.

6.2.2.6 Summary

The alternative shutdown stations at Ginna will provide the following capabilities:

(1) Charging Pump Room (Primary Station)

(a) Transfer switch to isolate control circuits of charging pump 1A bus 14 power breakers from fire areas of concern;

(b) Transfer switch to isolate and transfer primary system pressure and pressurizer level indication to local indicator panel;

(c) Transfer switch to provide instrumentation panel power from existing local charging pump 1A control circuitry;

(d) Local start/stop switches to operate charging pump 1A from this location.

within the first several hours. Closing two accessible manual valves, V-293A and V-293B, will achieve RCP seal return flow isolation.

Local charging flow indication exists on the Auxiliary Building Basement Level. The local mechanical flow indicators, FI-115 and FI-116, are located near the containment wall to provide local flow indication.

6.2.4.3 <u>Primary Pressure Control</u>

Primary system pressure control is accomplished by use of charging pump 1A (or safety injection pump 1B), as described in Subsection 6.2.4.2, and by automatic operation of the primary safety valves (overpressure protection).

The two primary system safety valves have a pressure set point of 2485 psig. Pressure control during hot shutdown conditions is provided by these two safety valves relieving pressure at the set point value. These safety valves are shown on Figure 3-5. Pressure reduction during the transition to cold shutdown will be achieved through control of the cooldown rate by operation of the primary PORVs. Adequate time exists to repair damaged control and power circuits, if necessary, or to make the valves operable with temporary power supplies and controls to ensure PORV operation for cold shutdown.

Primary system pressure increase capability is accomplished by use of the positive displacement charging pump or intermediate head safety injection pump described earlier. The operator will control both reactor inventory and primary system pressure by the use of these pumps.

TABLE 6-3 (continued)

Procedure	Description
CCW Repair Procedure (Optional)	Procedure to install spare CCW pump to replace damaged pumps. Includes pump installation procedure and replacement of damaged power feeds.
Water-Solid SG Operation	Procedure to utilize water-solid SG operation to achieve cold shutdown if RHR system is damaged by fire.
Source Range Neutron Monitor Installation Procedure	Procedure to install spare (backup) neutron monitor panel in IB to replace damaged source channels. Spare panel will be stored outside of the fire areas of concern (i.e., those areas where a fire may damage source range monitoring).
Long-Term DC Power Supply	Procedure to operate throwover switch and to install jumper cables in TSC vital battery manual throwover switch to allow for long-term supply of dc trains A and B from TSC battery and charger.
Pressurizer PORV Repair Procedure	Procedure to repair, or make operable with temporary equipment, the pressurizer PORVs for depressurization to achieve cold shutdown.

The turbine-driven AFW pump in the Intermediate Building can be operated at the pump by manually operating the steam admission and pump discharge valves. DC power is required for operation of the turbine-driven AFW lube oil pump. Power to this pump is normally supplied from the dc train B through the Turbine Building dc distribution panel. Since battery charger 1B power feeds may be damaged, the train B battery may become depleted within hours after the fire event. An intertie exists between the TSC battery and charger, and the main fuse cabinet 1B (train B). Use of this installed intertie will provide for long-term operation of the turbine-driven AFW pump.

An instrument panel will be installed at elevation 253 ft in the Intermediate Building North by the turbine-driven AFW pump to provide primary loop A system temperature, steam generator 1A pressure and level and turbine-driven AFW pump flow indication. This modification ensures that the required process variables will always be available to the plant operators.

Redundant source range monitor circuits may be damaged by a fire in this area. A spare source range drawer will be located on-site to provide for local indication at the IBN penetration. Procedures will be developed to connect the backup drawer with undamaged source range neutron detector circuits. Detectors and circuits inside containment will be protected from fire damage by the installation of radiant energy shields.