EGG-EA-5641

NOVEMBER 1981

SYSTEMATIC EVALUATION PROGRAM, TOPIC VI-7.C.1, INDEPENDENCE OF REDUNDANT ONSITE POWER SYSTEMS, R. E. GINNA NUCLEAR STATION

S. E. Mays
Revised by R. VanderBeek

Prepared for the
U.S. Regulatory Commission
Under DOE Contract No. DE-AC07-76ID01570
FIN No. A6425

EG&G Idaho, Inc

FORM EG&G 398
(Rev 11 79)

INTERIM REPORT

Accession No. _____

Report No. EGG-EA-5641

Contract Program or Project Title:

Electrical, Instrumentation, and Control Systems Support for the Systematic Evaluation Program (III)

Subject of this Document:

Systematic Evaluation Program, Topic VI-7.C.1, Independence of Redundant Onsite Power Systems, R. E. Ginna Nuclear Station

Type of Document:

Informal Report

Author(s):

S. E. Mays
Revised by R. VanderBeek

Date of Document:

November 1981

Responsible NRC Individual and NRC Office or Division:

Ray F. Scholl, Jr., Division of Licensing

EG&G Idaho, Inc.
Idaho Falls, Idaho 83415

Prepared for the
U.S. Nuclear Regulatory Commission
Washington, D.C.
Under DOE Contract No. DE-AC07-761D01570
NRC FIN No. A6425

INTERIM REPORT

0094J

SYSTEMATIC EVALUATION PROGRAM

TOPIC VI-7.C.1
INDEPENDENCE OF REDUNDANT ONSITE POWER SYSTEMS

R. E. GINNA NUCLEAR STATION

Docket No. 50-244

November 1981

S. E. Mays
Revised by
R. Vanderbeek
EG&G Idaho, Inc.

11-5-81

ABSTRACT

This SEP Technical Evaluation, for the R. E. Ginna Nuclear Station, reviews the electrical independence between redundant standby (onsite) power sources and their distribution systems.

FOREWARD

This report is supplied as part of the "Electrical, Instrumentation, and Control Systems Support for the Systematic Evaluation Program (II) being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Licensing by EG&G Idaho, Inc., Reliability & Statistics Branch.

The U.S. Nuclear Regulatory Commission funded the work under the authorization B&R 20-10-02-05, FIN A6425-1.

CONTENTS

SYSTEMATIC EVALUATION PROGRAM

TOPIC VI-7.C.1
INDEPENDENCE OF REDUNDANT ONSITE POWER SYSTEMS

FINAL DRAFT

R. E. GINNA NUCLEAR STATION

1.0 INTRODUCTION

The objective of this review is to determine if the onsite electrical power systems (AC and DC) are in compliance with current licensing criteria for electrical independence between redundant standby (onsite) power sources and their distribution systems.

General Design Criterion 17 requires that the onsite electrical power supplies and their onsite distribution systems shall have sufficient independence to perform their safety function assuming a single failure. Regulatory Guide 1.6, "Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems," and IEEE Standard 308-1974, "IEEE Standard Criteria for Nuclear Power Generating Stations" provide a basis acceptable to the NRC staff for meeting GDC 17 in regards to electrical independence of onsite power systems.

2.0 CRITERIA

2.1 AC Supplies. Regulatory Guide 1.6 Section D.4 states that when operating from standby sources, redundant load groups and redundant standby sources should be independent of each other at least to the following extent.

1. The standby source of one load group should not be automatically paralleled with the standby source of another load group under accident conditions

2. No provisions should exist for automatically transferring one load group to another load group or loads between redundant power sources

3. If means exist for manually connecting redundant load groups together, at least one interlock should be provided to prevent an operator error that would parallel their standby power sources.[2]

2.2 DC Supplies. As stated in Regulatory Guide 1.6, Section D.3, each d-c load group should be energized by a battery and battery charger. The battery-charger combination should have no automatic connection to any other redundant d-c load group.

3.0 DISCUSSION AND EVALUATION

3.1 AC Supplies

Discussion. The Ginna onsite emergency AC power system consists of two redundant diesel-generator power trains. Diesel generator 1A (DG1A) supplies 480 V buses 14 and 18 while diesel generator 1B (DG1B) supplies buses 16 and 17.

Manual means exist to tie buses 17 and 18 through a tie breaker and to tie buses 14 and 16 through a tie breaker. The control circuit for each breaker provides interlocks such that the breaker cannot be shut if either DG is closed on either bus or if the normal feeders to the bus are closed. Additionally, if the tie breakers are closed, they will trip open upon restoration of normal power, DG closing on the bus, or any safety injection signal.

Means exist to power safety injection pump SI-1C from either bus 14 or 16. The control circuit for the breaker from each bus is designed such that shutting of one breaker prevents shutting the other breaker so that paralleling the redundant DGs is prevented.

Instrument buses 1A, 1B, 1C, and 1D are capable of being supplied by multiple sources. Each bus is supplied by a pair of mechanically interlocked breakers such that paralleling of redundant sources is prevented.

Evaluation. The redundant onsite AC power trains have no automatic transfers of loads and/or load groups. The manual transfer of load groups or manual interconnection of emergency buses have the required interlocks to prevent inadvertent paralleling of redundant sources. Therefore, the onsite emergency AC system is in compliance with current licensing criteria for independence of onsite power systems.

3.2 DC Systems

Discussion. Ginna Nuclear Station has two redundant battery and charger trains to supply 125 V DC emergency loads. Each train consists of a battery, a 75-amp charger, and a 150-amp charger.

Means exist to interconnect both trains by manually shutting a tie breaker. This breaker is padlocked open and the key is maintained by the shift foreman. Current operating procedures require removal of the feeder fuse from one of the buses feeding the tie breaker prior to closing the tie breaker[3]. However, no interlocks exist to prevent closure of the tie breaker if the feeder fuse has not been removed. This would allow paralleling of the redundant DC trains.

Automatic transfer of 125 V DC load groups from train A to B (or vice versa) occurs in seven locations. Control power for 480 V switchgear on buses 14, 16, 17, and 18, DG1A control panel, DG1B control panel, and the rod drive MG set control panel automatically transfer to the redundant train on a loss of power from the normal source. Each load will automatically transfer back to the normal supply when it is regained.

Evaluation. The 125 V DC system has one manual tie between redundant trains and seven automatic transfers of power from one redundant train to the other. Although administrative controls are provided to prevent paralleling redundant trains via the tie breaker, no physical or electrical interlocks exist to prevent parallel operation of the two trains. Therefore, the 125 V DC system is not in compliance with Regulatory Guide 1.6 Section D.4.C for current licensing criteria with respect to independence of onsite power systems.

4.0 SUMMARY

The review of docketed information and plant electrical drawings indicate that the Ginna Nuclear Station onsite AC redundant power sources and distribution system meet the current licensing criteria for independence of onsite power systems. The 125 V DC system has seven automatically transferred loads and one manual tie breaker which are not in compliance with current criteria for independence of onsite power systems.

5.0 REFERENCES

1. General Design Criterion 17, "Electrical Power System," of Appendix A, "General Design Criteria of Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

2. "Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems," Regulatory Guide 1.6.

3. Rochester Gas and Electric Corp. letter (White) to NRC (Ziemann) dated April 18, 1979.

4. RG&E Corp. drawings 10905-59, 62, 63, 74, and 75.

5. RG&E Corp. drawings 21489-269, 33013-652 and 33013-756.