

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-244/87-23

Docket No. 50-244

License No. DPR-18

Licensee: Rochester Gas and Electric Corporation
49 East Avenue
Rochester, New York 14649

Facility Name: R. E. Ginna Power Station

Inspection At: Corporate Office in Rochester and at the Site

Inspection Conducted: September 28 - October 2, 1987

Inspector: *Thomas Koshy* 12-16-87
Thomas Koshy, Reactor Engineer date

Approved by: *C. J. Anderson* 12/16/87
C. J. Anderson, Chief, PSS, EB date

Inspection Summary: Inspection on September 28 - October 2, 1987

Areas Inspected: An announced inspection to follow up on the inspection finding identified in inspection report 87-16. The inspection involved the review of the DC system including design bases, criteria for fuse and cable sizing, field walkdown of battery and DC load centers.

Results: One violation was identified for a failure to provide adequate corrective actions for fuse anomalies.



DETAILS

1.0 Persons Contacted

1.1 Rochester Gas and Electric Corporation (RG&E)

James C. Bodine, Manager, Nuclear Assurance
Gary Cain, Instrumentation and Controls, Electrical Supervisor
George Daniels, Manager, Electrical Engineering Services
Clair Edgar, Director, Planning and Scheduling
*Walter Faustoferri, Electrical Engineer
John Hutchkiss, Manager, Modification Protection
Terry Kirkpatrick, Quality Control Inspector
*Julie Loria, Electrical Engineer
Thomas A. Marlow, Maintenance Manager
Robert Meeredy, Director, Engineering Services
Gary Meier, Division Training Manager
Jane Neis, Liaison Engineer
Terry Schuler, Operations Manager
Robert E. Smith, Chief Engineer
Bruce A. Snow, Superintendent Nuclear Production
John St. Martin, Station Engineer
Stanley Spector, Superintendent of Ginna Production
Joseph A. Widay, Technical Manager
Paul Wilkens, Manager, Nuclear Engineer

1.2 U.S. Nuclear Regulatory Commission (NRC)

T. Polich, Senior Resident Inspector
N. Perry, Resident Inspector
L. Bettenhausen, Chief, Projects Branch 1

*Not present at the exit meeting.

2.0 Purpose

The purpose of the inspection was to review the safety implications of oversized fuses in the class 1E DC distribution system.

3.0 Background

The Systematic Evaluation Program (SEP), topic VI-7.C.1 required a detailed evaluation of the DC system to assure the independence of redundant onsite power systems. In order to accomplish this, the licensee generated Engineering Work Request (EWR) 3341 to document the ampere rating and type of the fuses used in the DC system. This effort identified several fuse anomalies, but these problems were not effectively addressed to recognize their safety significance and to establish the necessary corrective actions.



The electrical fuses perform a variety of functions. The fuses are relied upon to promptly isolate electrical faults with a minimum system disturbance. A minimum system disturbance is achieved through the careful selection of the type and the rating of the fuse. Fuses are also used as electrical isolation devices between class 1E power supply and non class 1E electrical equipment. Besides the above two functions, the fuses assure that sufficient current is provided to the equipment. An oversized fuse, if higher than the upstream fuse could make the entire bus unavailable in case of a fault in the subject circuit. In addition, a faulted circuit with an oversized fuse can degrade the voltage of the bus and impart excessive heat to adjacent cables. On the other hand, an undersized fuse can prevent the safety function of the equipment by premature opening of the protected circuit.

4.0 DC Electrical System

4.1 Review of Unresolved Item 50-244/87-16-02: Safety Implications of Oversized Fuses in DC system - (Upgraded to a Violation)

This concern deals with the various oversized fuses in the DC panels. The installed fuses were rated substantially higher than what was represented in the drawing. This was brought to the attention of the licensee through the above unresolved item in the resident inspector's inspection report.

RG&E began a program to verify the fuse configuration in order to assure the independence of redundant on site power systems. This effort was initiated by SEP topic V1-7.C.1. The walkdown data collected through EWR 3341, identified numerous fuse anomalies. The interoffice correspondence to the Superintendent, Ginna Production, dated May 28, 1986 documents 26 oversized fuses and 43 undersized fuses and numerous unidentifiable fuses. The above correspondence also indicted that several field installations were different from design drawing. As of September 28, 1987, the licensee had not performed any corrective actions up to and including the current refueling outage. This document was approved by the Plant Operations Review Committee on June 4, 1986. The inspector requested the licensee's evaluation of this issue to confirm that the existing fuse configuration is acceptable. The licensee had not performed a specific evaluation to determine the acceptability of the fuse anomalies. In addition, these discrepancies were not documented as nonconformance reports. This is a deviation from RG&E Station procedure A1502 Nonconformance reports Revision 10, Section 3.1.3 and 3.4.6 which requires nonconformance (deficiency in characteristic) pertaining to operating equipment be reported to Ginna Station Superintendent and that the superintendent shall evaluate the safety impact of the



nonconformance and determine the need for and implement any further controls. This constitutes a violation of 10 CFR 50, Appendix B criterion XVI which requires measures be established to assure that conditions adverse to quality, such as deficiencies be promptly identified and corrected. The subject unresolved item is upgraded to a violation.

4.2 Corrective Actions and Commitments

During the course of the inspection, the licensee promptly developed a corrective action program to address the fuse anomalies. Two teams were assigned to complete the walkdown of the remaining DC panels. As a result, additional fuse anomalies involving oversize, undersize and unidentifiable fuses were identified. A task force was developed to document a safety evaluation for each of the anomalies. This evaluation categorized each anomaly based on its safety significance and developed a timely schedule for corrective actions. All of the priority 1 and 2 fuse discrepancies which had relatively higher significance, were attended to immediately except in cases where the plant operation would be disrupted. The licensee committed to resolve these no later than the 1988 refueling outage.

All priority 3 fuse discrepancies which can be resolved at power without subjecting the plant to an operational challenge due to the fuse replacement or post maintenance test will be resolved before the next refueling outage.

In addition to the licensee's program to correct fuse anomalies, the licensee had previously initiated a fuse test program to provide assurance of fuse performance. Tests involve destructive tests and performance tests. This program is intended for replacing all of the present fuses with qualified fuses. The licensee committed to complete this program by the end of the 1989 refueling outage.

These commitments were subsequently documented in a letter to NRC dated October 21, 1987. The NRC staff reviewed the commitments of this letter and had no further questions in this regard.

4.3 Seismic Supports for Safety Related Batteries

During the plant walkdown, the inspector observed large spacers in between battery jars. The seismically qualified metallic supports surround the battery jar rows. The large wooden spacers were added to fill the gap that resulted from new physically smaller replacement batteries. The class 1E battery 1A had two spacers approximately 14" and 8" wide. These spacers are wooden blocks covered with open cell styrofoam sheets. This battery is presently qualified for 20 years. The resiliency of such large piece of wooden blocks to withstand



seismic forces cannot be assured when exposed continuously to a corrosive environment. This poses no immediate concern because batteries A and B were installed recently during the 1985 and 1986 outages. There were no visible signs of degradation. However, the potential degradation of these wooden blocks call for surveillance or appropriate corrective action. The licensee representatives agreed to review this concern and take actions, as necessary, to resolve this concern. This is an unresolved item pending NRC review of the licensee action to assure the integrity of the battery seismic supports that utilize wooden spacers. (50-244/87-23-01).

4.4. DC Power Cable Ampacity and Protection

The walkdown data collected through EWR 3341 identified numerous fuse anomalies. These anomalies resulted from inadequate controls on maintenance activities. Fuse replacement based solely on load demands can lead to overloading the power cable. The NRC walkdown noted unidentifiable power wiring with an yellow insulation at the DC distribution panel in the turbine building. The ampacity rating of the unidentifiable cables is undetermined. The majority of the power cables identifiable are of the kerite type.

The electrical fuses also serve as short circuit protection devices. This protection should be coordinated to ensure minimum system disturbances in case of a short circuit in any circuit. The licensee developed a design analysis "Cable Ampacities for DC Fuse Coordination," Revision 0 for addressing this concern. The fuse anomalies observed during the inspection necessitates a fuse coordination review. The inspector reviewed the fuse sizing criteria including:

- The minimum fuse sizing margin for the non 1E circuits to facilitate prompt clearing of the fault.
- Higher fuse sizing margin for 1E circuits so that the circuit can perform the safety function in spite of all foreseeable transients (e.g., locked rotor current, prolonged temperature excursions, voltage degradation etc.).

The licensee stated they planned to factor these considerations into the sizing criteria. The licensee committed to walkdown the main DC system distribution panels by October 30, 1987. They also committed to develop a schedule to walkdown the remaining cables by October 30, 1987. The data collected in this effort will be utilized to assess the adequacy of cable sizing and fuse coordination. This is an unresolved item pending NRC review of the licensee's action to review fuse coordination and adequacy of cable sizing in the DC electrical circuits. (50-244/87-23-02)



4.5 DC System Integrity and Voltage Regulation

The SEP topic VI-7.C.1, Independence of Redundant Onsite Power Systems, required a detailed evaluation of the DC system. The licensee submitted a design analysis, "Short Circuit Analysis/Throw-over Contactor" to the NRC. This analysis was approved by the NRC in a letter dated November 27, 1981. This letter states that "the present design and administrative controls provide an acceptable alternative to our criteria, provided fuse types and sizes, battery capacity, and electrical loads are not changed." However, the licensee had replaced the batteries with batteries having a different capacity in the 1985 and the 1986 outage without prior design analysis. In addition, the licensee is planning to replace the existing fuses as soon as the qualified fuses are available through the inhouse testing program. The licensee has committed to perform a design analysis of the new fuses with the new battery prior to implementing the change in the fuses.

The inspector observed the DC system voltage to fluctuate from 128 volts to 132 volts. The licensee analysis uses 128 volts. Based on the concerns identified in cable sizes and fuses, the inspector inquired about under voltage considerations at long power feeders. The licensee had not performed a study to address under voltage concerns assuming the effects of the design basis events on the the DC system. This is an unresolved item pending NRC review of the licensee design analysis for the SEP commitments and the under voltage study for DC power feeders. (50-244/87-23-03)

4.6 Observations

During the NRC walkdown of the DC electrical system the following observations were shared with the licensee management.

- The use of fixed length tie wraps used for reducing the fuse clip size did not appear to offer sufficient copper contact area.
- The fuse clip reducers utilized in several DC panels were squeezed excessively at the extremities resulting in reduced copper contact area.
- The DC panel located in the turbine generator building did not have fire barriers at the entrance or exit of power cables. It was noted that this fire barrier is not a required Appendix R barrier.

The above issues do not represent items of noncompliance or significant safety issues. The licensee plans to address these issues and undertake any necessary corrective actions through training and field changes.



5.0 Unresolved Item

Unresolved items are matters about which more information is needed in order to ascertain whether they are acceptable items or violations. An unresolved item identified during this inspection is discussed in Sections 4.3, 4.4 and 4.5 of this report.

6.0 Exit Meeting

The inspectors met with the licensee corporate personnel and the representatives from the plant at the conclusion of the inspection on October 2, 1987. The inspectors summarized the scope of the inspection and the inspection findings.

At no time during this inspection was written material given to the licensee.

