U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-244/78-20

Docket No. 50-244

License No. DPR-18 Priority -- Category C

Licensee: Rochester Gas and Electric Corporation

89 East Avenue

Rochester, New York 14649

Facility Name: R. E. Ginna Nuclear Power Plant, Unit 1

Inspection at: Ontario, New York

Inspection conducted: September 27-28, 1978

Inspectors: for W. J. Raymond, Reactor Inspector — 10/24/78 date signed

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Approved by: R. R. Keimig, Chief, Reactor Projects Section No. 1, RO & NS Branch — 10-25-78 date signed

Inspection Summary:
Inspection on September 27-28, 1978 (Report No. 50-244/78-20)
Areas Inspected: Routine, announced inspection by a regional based inspector of licensee actions to upgrade electrical splice insulation on safety related circuits, including: observation of completed work; preparations for qualification testing; established administrative controls; and, procedural guidance provided for actuation of SIS Reset Feature. The inspection involved eleven inspector-hours onsite by an NRC regional based inspector.
Results: No items of noncompliance were identified.

## DETAILS

1. Persons Contacted

*Mr. W. Backus, Operations Supervisor
Mr. G. Daniels, Manager, Electrical Engineering
*Mr. C. Edgar, Instrument and Control Foreman
*Mr. R. Latz, Electrical Foreman
*Mr. J. Noon, Assistant Plant Superintendent

The inspector also interviewed other licensee personnel, including members of the training, operations and maintenance staff.

*denotes those present at exit interview.

2. Inspection Purpose

An entrance interview was held with station management at the start of the inspection on September 27, 1978, to explain that the purpose of the inspection was to review the current status of RG&E's program to upgrade electrical splice insulation on selected plant system circuits. Procedural guidance for the SIS reset feature would also be reviewed.

3. Cable Splice Insulation

a. Background

During the review of environmental qualification for plant electrical systems, as documented in NRC:Region I Inspection Report No. 50-244/78-17, the licensee identified circuits in use on safety-related systems which contained splices at the penetration inside of containment. There was no documentation to demonstrate that the insulation used to cover the splices was qualified for LOCA and main steam line break (MSLB) environments. Subsequently, the licensee evaluated the safety-related functional requirements of these circuits, identified the materials and configuration of existing circuits, and evaluated the need to upgrade the qualification of existing splices. Preliminary results of the licensee's evaluation were presented to the NRC:Region I staff on September 11, 1978. This evaluation is to be formally transmitted to the NRC at a later date.

Of the circuits containing splices at the penetration inside of containment, only those associated with the pressurizer, RHR core deluge valves and the containment fan cooler units were found to require further review and/or corrective action.

The functional requirements and original physical condition of circuits associated with each of the above subsystems are summarized below.

(1) Pressurizer level and pressure instrumentation are required for SI during the first few seconds of a large break LOCA, after which the pressurizer will be empty. (The instrumentation requirements are longer for small breaks, but the environmental effects are correspondingly less severe.) Additionally, the high containment pressure SI actuation at 6 psig serves as a backup for the large break LOCA, and circuits for these trip signals are located outside of containment. The pressurizer circuits are not required to provide a safety function more than 5 minutes after an accident occurs. Pressurizer level channels LT 426, 427, and 428, and pressurizer pressure channels PT 429, 430, and 431, each contain two separate splices inside containment adjacent to the penetration canister header. Crimp lug type splice connections are used. The splices immediately adjacent to the penetration canister were originally sleeved with thin wall heat shrink tubing. The second set of splices, located within two to three feet of the first set and enclosed in a steel splice box, used polyvinyl electrical tape as an insulator.

(2) The RHR core deluge valves, MOVs 852A and 852B, are required to open upon SI actuation. Once open, no further function is required. In that the circuits associated with the 852A/B MOVs are subject to LOCA flood conditions, plant emergency procedures require that power be removed from these valves immediately after they have been verified OPEN following on accident sequence. (Reference: Procedure E-1.1, Revision 6, 'Safety Injection System Actuation', dated August 31, 1978.) This evalution has been addressed by NRC:NRR and is described in the SER for Amendment 14 of the Ginna Technical Specifications. The 852A/B MOVs are not required to perform a safety function more than 5 minutes after an accident occurs. The physical configuration, splice connection and insulating materials used for the MOV circuits inside of containment are similar to that described above for the pressurizer circuits (with the exception of the potential for flood conditions).

(3) The containment fan coolers and post accident filters are required for long term pressure control and iodine removal. It has been shown (FSAR 14.3.4, 14.3.5 and Technical Specification 3.3.2.2 basis) that one spray pump is equivalent to two fan coolers for pressure suppression and to one fan cooler post accident filter for iodine removal. Thus, two spray pumps will meet the analysis requirements if the containment fan coolers are lost. The 480V 3 phase cable splices for the 4 fan cooler units consist of bolted spade lugs crimped on 500 MCM cable. The orginal insulation for the splices consisted of a covering of insulating putty, two layers of varnished cambric, and polyvinyl electrical tape. The 480V circuits enter containment through penetrations AE1, AE4, CE21, and CE24 between elevations 260' and 270' which is above LOCA/MSLB flood level and away from the direct effects of a LOCA/MSLB blow down. (Reference: RG&E Drawing No. 33013-731, "Electrical Penetration/Primary and Secondary Piping Composite", Revision 1). The inspector verified by direct observation during this inspection that these circuits are physically removed from high energy piping and that the splices are enclosed with a heavy gauge steel screen.

b. Proposed Actions

The licensee proposed the following actions to enhance/demonstrate the reliability of safety-related systems.

(1) Cable splice insulation on the 852 MOVs, pressurizer and fan cooler circuits would be replaced by qualified heat shrink tubing which has undergone extensive LOCA/MSLB exposure testing (FIRL Technical Report F-C40333). Change out of the insulation could be conducted with the plant at power and would require about two weeks to complete. This work was started on September 18, 1978.

(2) In that the materials and configurations of the Ginna splices differed from those in the existing qualification test reports, a qualification test of the Ginna configuration with the qualified sleeves is scheduled to be conducted at the Franklin Institute. The licensee proposed to test a mockup of the 480V fan cooler and the low voltage instrumentation/control splice configurations, with the 480V splice test tentatively scheduled to begin on October 16, 1978.

(3) Resistivity measurements will be made on the low voltage instrumentation/control circuits, during insulation replacement, on any lugs that are not removed from the circuit.

(4) Plant emergency procedures will be revised to provide additional instructions to plant operators to ensure both containment spray pumps are available during the post accident period.

(5) Surveillance test results on the containment spray system will be made available for NRC:Region I review.

4. Observation of Splice Insulation Replacement

Replacement of the splice insulation was in progress at the start of this inspection. As of September 27, 1978, work had been completed on the pressurizer and 852 MOV circuits as well as for two of the four containment fan cooler circuits. The inspector accompanied licensee personnel into containment to review the work already completed and to observe the work in progress on the third (circuit L228) fan cooler unit. The following circuits were reviewed:

| COMPONENT | CIRCUIT/FUNCTION | PENETRATION | WORK STATUS |
|---|---|---|---|
| Pzr LT 426 | R3409/xxx | AE-10 | Complete |
| Pzr LT 427 | R957/xxx | CE-5 | Complete |
| Pzr LT 428 | R1003/xxx | CE-6 | Complete |
| Pzr LT 429 | R3407/xxx | AE-10 | Complete |
| Pzr LT 430 | R951/xxx | CE-5 | Complete |
| Pzr LT 431 | R997/xxx | CE-6 | Complete |
| MOV 852B | C1097/Control | AE-3 | Complete |
| MOV 852B | C1095/Power | AE-3 | Complete |
| Cont. Recirc Fan | L228/Power (IC) | AE-1 | In Progress |
| Cont. Recirc Fan | L219/Power (IB) | AE-4 | Not Yet Started |
| Cont. Recirc Fan | L341/Power (IA) | CE-21 | Complete |
| Cont. Recirc Fan | L358/Power (ID) | CE-24 | Complete |

The work was reviewed to verify conformance with the applicable maintenance procedures, vendor installation instructions and general maintenance practices. Except as noted below, no inadequacies were identified in the installation of the qualified sleeves.

As noted above, the pressurizer circuits contain two splices near the penetration area; the first is located within several inches of the penetration header and the second is located several feet away and is enclosed within a splice box. No discrepancies were noted on splices enclosed within splice boxes. However, on circuit cables 24 (circuit R3407) and 25 (circuit R3409) at penetration AE-10, it was noted that the outer most heat shrink tubing was not sealed in accordance with the installation instructions (Reference: Procedure EM-207, 'Replacing Splices and Splice Sleeves for Pressurizer Pressure and Level Channels', Revision 0, dated September 15, 1978) in that the end of the sleeve on the penetration side was open, and the required two inch length of sleeving from the splice to the sleeve end was not apparent. The two inch overlap requirement is important relative to the conditions used in the qualification tests. The licensee stated that the pressurizer circuits would be re-examined to determine the corrective action to be taken.

In a telephone conversation with a licensee representative on September 29, 1978, after examining the circuits and measuring the sleeve overlap, the licensee stated that most of the pressurizer circuits near the penetration marginally met the two inch overlap requirements and that the affected splices would be reworked to ensure that the installation is in conformance with the requirements. The rework was expected to be completed by October 13, 1978.

The inspector had no further questions at this time, but stated this item was unresolved and would be inspected on a subsequent inspection (244/78-20-01).

5. Qualification Testing

The licensee provided a copy of the Franklin Institute Test Proposal (No. 19817-I) for NRC review. The test proposal will be converted to a detailed set of test procedures and transmitted to NRC:Region I for staff review. Environmental qualification testing of the 480V fan cooler configuration is tentatively scheduled to be started on October 16, 1978. The licensee stated that consideration is being given to not testing the low voltage instrumentation and control circuit configuration, if RG&E can acceptably justify that the Ginna configurations are sufficiently similar to the parameters used in the original FI qualification tests. The inspector stated that this approach would be acceptable, pending subsequent NRC staff review, if the following minimum conditions were met:

a. The minimum two inch insulation overlap criterion was satisfied; and,

b. The licensee was able to demonstrate material compatability between the sleeving and the cable insulation presently used on plant safety circuits.

The licensee acknowledged the inspector's comments.

The inspector had no further comments on qualification testing at this time, but stated that this area would be reviewed during a subsequent inspection (244/78-20-02).

6. Resistivity Measurements

The inspector reviewed, on a sampling basis, the results of the resistivity measurements made on pressurizer circuits in accordance with CP426, 427, 428, 429, and 430. The inspector noted for the circuits reviewed that the circuit resistance was negligible (on the order of 1 to 3 ohms) when the individual channel wires were shorted, and infinite when the measurement was made from the conductor to ground.

The inspector had no further questions on this item at this time.

7. Emergency Procedure Changes

The inspector reviewed emergency procedure E-1.2, "Loss of Coolant Accident", Revision 10, and noted that it has been revised in sections 4.2.1, 4.3.7, and 4.5.6 to state that if one diesel on a safeguard bus becomes inoperable during the post accident period, the operator, after assuring that any faults are cleared, will initiate a bus tie (buses 14 to 16) to energize the inactive containment spray pump, while ensuring the diesel is not overloaded.

The inspector had no further comments on this item at this time.

8. Containment Spray System Tests

The inspector reviewed a completed copy of procedure PT-30, "Containment Spray Nozzle Check of A and B Rings", completed satisfactorily on February 8-14, 1974, to verify full functional capability of the CS system spray headers. The inspector had no further comments on this item.

The completed results for PT-3, showing satisfactory completion of the monthly test of the CS pump and NaOH additive system, will be reviewed by NRC:Region I during a subsequent inspection (244/78-20-03).

9. SIS Reset Feature

Plant emergency procedures were reviewed with licensee personnel to ascertain what guidance was provided to plant operators regarding

the use and applicable precautions governing actuation of the SIS reset feature following inadvertant and actual (accident) safeguard system operation. The inspector noted that although sufficient guidance was provided to assure that safeguard actuation and equipment operation were proceeding as required in response to an accident, no specific guidance was provided to outline the operator action required if a loss of offsite power occurs during the injection phase of an accident and the SIS has been reset in preparation for switch-over to recirculation.

The licensee stated that emergency procedures E1.2, E1.3, and E1.4 would be revised by October 16, 1978 to provide instructions for the operator to manually re-initiate the SI signal and ensure that the required safeguard equipment is energized on the emergency buses.

The inspector stated that this item would be reviewed on a subsequent inspection (244/78-20-04).

10. Unresolved Items

Unresolved items are those items for which more information is required to determine if the item is acceptable or an item of noncompliance. An unresolved item is contained in detail 4 of this report.

11. Exit Interview

A management meeting was held with licensee personnel (denoted in Detail 1) at the conclusion of the inspection on September 28, 1978. The purpose, scope and results of this inspection were discussed as they appear in the details of this report.