Design Criteria

Ginna Station

S/G Containment Penetration

Rochester Gas and Electric Corporation

89 East Avenue

Rochester, New York 14649

EWR 4998

Revision 2

March 14, 1990

Prepared by: Walter Toro — Mechanical Engineer — 3/14/90 DATE

Reviewed by: R T Davis — Quality Assurance Engineer — 3-14-90 DATE

Approved by: Eugene K. Lois — Manager, Mechanical Engineering — 3/14/90 DATE

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Design Criteria

1.0 Summary Description of the Design

1.1 Summary

1.1.1 The Steam Generator Inspection/Maintenance (SGI/M) cabling is routed through the equipment hatch during the Annual Inspection and Outage (AI&O).

1.1.2 Generic Letter GL-88-17 addresses the potential for core uncovery to occur due to loss of Decay Heat Removal (DHR). As part of RG&E's response to GL-88-17 a commitment was made to achieve containment closure within 2 hours following initial loss of DHR. (Letter from R. Mecredy to C. Stahle, dated 2/1/89).

1.1.3 Routing the SGI/M cabling through the equipment hatch is no longer an acceptable practice for the following reason. In the event of loss of DHR, disconnecting cables and re-assembling the hatch would require considerable effort which could exceed the 2 hour time requirement.

1.1.4 The proposed design involves modification to the existing containment penetration No. 2 (spare mechanical penetration) to provide access into containment for the SGI/M cabling during AI&O's. This modification would facilitate the re-assembly of the containment hatch within the required time and allow the SGM/I cabling exclusive use of a penetration. The work scope includes:

1.1.4.1 Removing the capped ends of the existing penetration.

1.1.4.2 Installing removable flanges or other closure devices and test connections.

1.1.4.3 Evaluating the impact of the changes to the penetration.

1.1.5 The installation of the proposed modification shall be performed in two phases. Phase 1 includes the work performed outside containment and Phase 2 includes the work performed inside containment. Phase 1 could be completed prior to the AI&O and Phase 2 during the first days of the AI&O. A satisfactory leak test per Section 23.1 (to limits specified in 1.3.1) shall be performed prior to the start of Phase 1.

1.2 Functions

1.2.1 The function of the penetration closure assembly is to provide a reliable, leak-testable sealed closed barrier

at the in and outboard ends of containment penetration No. 2.

1.3 Performance Requirements

1.3.1 The leakage for both inboard and outboard closures at penetration No. 2 shall be limited by the leakage requirements given in section 4.4 of the Ginna Technical Specifications, and section 6.2.6 of the UFSAR for Ginna.

1.4 Control

1.4.1 The penetration closure assemblies will be manually removed and reassembled during plant outages when required.

1.5 Modes of Operation

1.5.1 Normal Operation

1.5.1.1 The closure assemblies at penetration No. 2 will remain in place, until the reactor is in the cold shutdown mode per Technical Specifications 3.6.1.

1.5.2 Emergency Operation

1.5.2.1 In the event a loss of DHR is initiated during cold shutdown the closure assemblies shall be capable of achieving containment closure as defined in the reference 2.12 letter, within the 2 hour time frame commited in the reference 2.11 letter.

2.0 Referenced Documents

2.1 USNRC Documents

2.1.1 Regulatory Guide 8.8 "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be as Low as is Reasonably Achievable (ALARA)"

2.1.2 Regulatory Guide 1.26 "Quality Group Classifications and Standards for Water, Steam, and Radioactive Waste-Containing Components of Nuclear Power Plants".

2.1.3 Regulatory Guide 1.29 "Seismic Design Classification".

2.1.4 Standard Review Plan NUREG-0800, Rev. 2, dated July 1981.

2.1.5 Generic Letter No. 88-17, dated October 17, 1988.

2.2 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code 1986 Edition.

2.2.1 Section II Material Specification.

2.2.2 Section III Nuclear Power Plant Components.

2.2.3 Section IX Welding and Brazing Qualification.

2.3 American National Standard Institute (ANSI).

2.3.1 ANSI/ASME NQA-2, 1986 Edition "Quality Assurance Requirements for Nuclear Power Plants".

2.3.2 ANSI B16.5-1988 "Pipe Flanges and Flanged Fittings".

2.3.3 ANSI N45.4-1972 "Leakage-Rate Testing of Containment Structures for Nuclear Reactors".

2.3.4 ANSI/AWS D1.1-1988 "Structural Welding Code".

2.3.5 ANSI/ANS 56.2-1984 "Containment Isolation Provisions for Fluid Systems".

2.3.6 ANSI/ANS 56.8-1987 "Containment System Leakage Testing Requirements".

2.3.7 ANSI/ASME NQA-1, 1986 Edition, "Quality Assurance Program Requirements for Nuclear Facilities".

2.4 R. E. Ginna Nuclear Power Plant Technical Specifications.

2.5 Updated Final Safety Analysis Report (UFSAR) for R.E. Ginna Nuclear Power Plant.

2.6 American Institute of Steel Construction AISC "Steel Construction Manual" 8th Ed.

2.7 American Concrete Institute "Code Requirements for Nuclear Safety Related Structures" ACI 349-85.

2.8 American Society for Nondestructive Testing, Recommended Practice SNT-TC-1A - 1980 Ed.

2.9 Institute of Electrical and Electronics Engineers, IEEE Std. 383-1980 "Standard for Type Test of Class 1E Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations".

2.10 Code of Federal Regulations 10 CFR 50 1988 Ed.

2.11 RG&E letter from R.C. Mecredy to C. Stahle (NRC), dated February 1, 1989.

2.12 Westinghouse transmittal "WOG-88-156", dated 11/7/88. "Transmittal of Mid-Loop Operations Interim Guidance and Workshop Attendance List".

2.13 Ginna Station, Quality Assurance Manual.

3.0 Seismic Category

3.1 Consistent with USNRC Regulatory Guide 1.29 this modification is seismic category I.

4.0 Quality Group/Code Class

4.1 Regulatory Guide 1.26 does not consider nor classify containment penetration assemblies therefore, no code class is required, however, ASME Code Class 2 will be used as guideline for this modification.

5.0 Electrical System Safety Classification

N/A

6.0 QA Program Applicability

6.1 The QA program requirements of the Ginna QA Manual shall be applicable to this modification.

7.0 Codes, Standards and Regulatory Requirements

The following requirements shall apply to the design and installation of the modification of containment penetration No. 2:

7.1 The design, materials, fabrication, installation, examination and testing of the penetration closure assembly shall be in accordance with the requirements of ASME Section III, Subsection NC.

7.2 The design, fabrication and erection of any closure assembly support shall be in accordance with the requirements of the AISC Specification.

8.0 Design Conditions

8.1 Inside Containment

Design pressure 60 psi (UFSAR Table 3.11-1)
Design temperature 286°F (UFSAR Table 3.11-1)

8.2 Outside Containment

Design pressure = atmospheric
Design temperature = 2°F min. + 91°F max.
(UFSAR sect. 2.3.2.1)

8.3 The proposed penetration modification shall be designed for the most severe (inside containment) condition, however the outside containment min. temperature shall also be considered.

9.0 Load Conditions

9.1 The penetration shall be evaluated to withstand, pressure, deadweight, thermal and seismic loading conditions.

10.0 Environmental Conditions

10.1 The following environmental conditions shall be considered for this modification inside containment:

	Normal	Accident
Temperature	60°F-120°F	286°F
Pressure	0 psig	60 psig
Humidity	50% (nominal)	100%
Radiation	< 1rad/hr	see tables 3.11-2 and 3.11-3 ref. 2.5
Chemical Spray		Solution of boric acid (2000-3000 ppm boron) solution ph 8 - 10
Flooding		7 ft., maximum submergence elevation is 242'-8"

10.2 The following environmental conditions shall be considered for this modification outside containment:

	Normal
Temperature	2°F, +91°F
Pressure	atmospheric
Humidity	10% - 100%

10.3 Severe Weather Conditions

The effect of severe weather conditions shall be considered in the design. This shall include consideration of environmental conditions associated with routing or locating hardware (equipment, components, piping, tubing, valves, instruments, panels, cabinets, etc.) near exterior walls, doors louvers or other openings.

10.4 Proximity of Existing Systems or Equipment

The potential for localized environmental conditions (contagious or intermittment) due to proximity of

adjacent hardware (equipment, components, pipings, tubing, valves, instruments, panels, cabinets, conduit, etc.) shall be considerd in the design. This shall include the effects of routing (or locating) new (or modified) hardware near existing hardware which operates at high temperatures.

11.0 Interface Requirements

11.1 All modifications to existing penetration shall not degrade existing structure nor compromise containment integrity.

12.0 Material Requirements

12.1 Materials used for modifications to the existing penetration shall be compatible with existing materials.

13.0 Mechanical Requirements

13.1 All mechanical devices shall be installed such that containment integrity is not compromised.

14.0 Structural Requirements

14.1 The need for missile protection for the penetration shall be evaluated.

14.2 The structural integrity of the proposed modified containment penetration shall be evaluated.

14.3 Any modifications made to existing concrete shall comply with the applicable requirements of the ACI 349 code.

15.0 Hydraulic Requirements

None

16.0 Chemistry Requirements

Design of items located inside containment shall include consideration that they may be subject to a chemical spray as specified in section 10.

17.0 Electrical Requirements

None

18.0 Operational Requirements

18.1 During cold shutdown this modification shall permit this penetration to achieve containment closure (as

defined in the reference 2.1.5 letter) within 2 hours of initial loss of DHR as committed in the reference 2.11 letter.

18.2 The modification to the penetration shall not degrade existing containment integrity requirements.

19.0 Instrumentation and Control Requirements

19.1 Any instrument added to the penetration shall not degrade the function of the penetration.

20.0 Access and Administrative Control Requirements

20.1 The need for anti-tampering features in order to maintain containment integrity shall be reviewed.

20.2 All pertinent plant/maintenance procedures shall be revised, if necessary, to incorporate any requirements that may result as part of this modification.

21.0 Redundancy, Diversity and Separation Requirements

21.1 Modification to the penetration shall maintain existing redundancy, diversity and separation requirements.

22.0 Failure Effects Requirements

22.1 The penetration shall remain functional following a safe shutdown earthquake.

23.0 Test Requirements

23.1 The penetration shall undergo Appendix J Testing in accordance with the provisions of 10CFR50.

23.2 Upon completion of phase 1, a simulated and unannounced test shall be performed to verify that SGI/M cabling can be disconnected and penetration closed within the required 2 hours using work crews who will normally be assigned to perform the function. A satisfactory containment closure test shall be performed after penetration has been assembled in this manner.

24.0 Accessibility, Maintenance, Repair and Inservice Inspection Requirements

24.1 This modification shall not degrade existing penetration accessibility, maintenance, repair, and inservice inspection requirements. New welds and supports shall be located in a manner so they are accessible for in-service inspection.

25.0 Personnel Requirements

25.1 Welding associated with the safety-related mechanical portion of this modification (such as piping, pipe supports, equipment supports, tubing supports, etc.) shall be performed by personnel who are qualified in accordance with the requirements of ASME Section IX.

25.2 Welding associated with the structural, and non-safety related mechanical portion of this modification shall be performed by personnel who are qualified in accordance with the requirements of either ASME Section IX or AWS D1.1.

25.3 All NDE personnel, where required in performing the modifications, shall be qualified in accordance with the requirements of ANSI NQA-1 and/or SNT-TC-1A.

26.0 Transportability Requirements

None

27.0 Fire Protection Requirements

27.1 Electric cable used in the modification shall meet the flame test requirements of IEEE 383-1974.

27.2 The modifications shall not degrade existing fire barriers or affect the performance of any existing fire protection equipment.

27.3 All new penetrations through fire barriers shall be sealed with appropriate fire seals.

27.4 Where cable installation requires cable insertion through a silicone foam fire stop or seal, care must be taken to prevent loss of seal integrity. Since the seal is established by the pressure of the silicone foam on the cable, rather than by adhesion, a new cable may be inserted if there is sufficient space available. After the cable has been fully inserted, the seal shall be visually inspected on both sides to assure that the seal is still fully intact. If visual inspection reveals any damage to the seal, it shall be repaired or removed and replaced.

27.5 All new penetrations through walls, ceilings, or floors which are not fire barriers but provide a Halon fire Suppression System Boundary shall be sealed with appropriate air seals.

27.6 Material used in this modification shall not increase the probability or consequence of a fire.

27.7 A review shall be performed to ensure the modified system continue to comply with 10CFR50 Appendix R requirements.

28.0 Handling Requirements

Material required for this modification shall be handled in accordance with the requirements of ANSI/ASME NQA-2-1986 Edition.

29.0 Public Safety Requirements

None

30.0 Applicability

None

31.0 Personnel Safety Requirements

31.1 The design and installation of all modifications shall comply with the applicable requirements of USNRC Regulatory Guide 8.8. ALARA shall be addressed for any portion of the work; in particular, for any work required in a high radiation area. Applicable typical survey maps of the appropriate areas are attached and are considered to be part of this criteria.

32.0 Environmental Qualification Requirement

None

33.0 Unique Requirements

33.1 Operational Experience

Relevant experience from Ginna and other facilities should be considered during the design process. Applicable NRC bulletins, notices, and INPO SOERs, as a minimum, should be requested from the Operational Assessment Group at Ginna for review during the development of the design.

33.2 Provisions shall be taken so that the closure assembly is re-assembled within the 2 hour time requirement.

Safety Analysis

Ginna Station

S/G Containment Penetration

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EWR 4998

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Prepared by: Walter Toro — Mechanical Engineer — 3/14/90 DATE

Reviewed by: Mark D Flaherty — Nuclear Engineer — 3/14/90 DATE

Approved by: [signature] — Manager, Nuclear Engineering — 3-14-90 DATE

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Safety Analysis

1.0 Description of Scope

1.1 Summary

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1.1.4 The proposed design involves modification to the existing containment penetration No. 2 (spare mechanical penetration) to provide access into containment for the SGI/M cabling during AI&O's. This modification would facilitate the re-assembly of the containment hatch within the required time and allow the SGI/M cabling exclusive use of a penetration.

1.1.5 The work scope associated with the proposed modification includes:

1.1.5.1 Removing the capped ends of the existing penetration.

1.1.5.2 Installing removable flanges or other closure devices.

1.1.5.3 Evaluating the impact of the changes to the penetration.

2.0 References

2.1 Design Criteria for EWR 4998, Rev. 2, dated 03/14/90 "S/G Containment Penetration".

2.2 Ginna Station Updated Final Safety Analysis Report.

2.2.1 Section 3.1.2.1, "Overall Requirements".

2.2.2 Section 3.1.2.5, "Reactor Containment".

2.2.3 Section 3.8.1.5, "Penetrations".

2.2.4 Section 6.2.4, "Containment Isolation System".

2.2.5 Section 6.2.6, "Containment Leakage Testing".

2.3 R. E. Ginna Nuclear Power Plant Technical Specifications.

2.3.1 Section 3.6, "Containment System".

2.3.2 Section 4.4, "Containment Tests".

2.3.3 Section 5.2.2, "Penetrations".

2.4 USNRC Generic Letter No. 88-17, dated October 17, 1988.

2.5 ANSI/ANS 56.2-1984, "Containment Isolation Provisions for Fluid Systems after a LOCA".

3.0 Safety Analysis

3.1 A review has been made of the design basis events to determine those related to the proposed modification. The events associated with this work are:

3.1.1
a) Fires
b) Seismic Events
c) Natural Phenomena
d) Missile Hazards
e) Containment Integrity

3.2 The following assessment is made:

3.2.1 The probability and consequences of a fire have been addressed in Section 27.0 of the modification design criteria. As described in the criteria, fire barriers will not be degraded and material used will meet criteria equal to or greater than those presently installed. This modification will be reviewed against the assumptions of 10CFR50 Appendix R to assure continued compliance. Therefore, the modifications will not alter the area fire loading, the sources of fire initiation, nor the acceptability of the consequences of a fire.

3.2.2 Section 3.1 of the Design Criteria classifies the penetration as Seismic Category I. The penetration modification will be evaluated, as addressed in sections 9.0, 11.0 and 14.0 of the modification design criteria, to withstand seismic loading and to maintain the structural integrity of the existing penetration.

3.2.3 Section 10.3 of the Design Criteria requires that the effects of severe weather conditions be considered in the design of the penetration modification. It is also

required, in section 11.1, that the existing structure not be degraded by the proposed modification.

3.2.4 The need to evaluate for missile protection for this proposed penetration modification is addressed in section 14.1. of the Design Criteria.

3.2.5 Sections 11.1 and 13.1 of the modification Design Criteria require the proposed modification not to compromise containment integrity.

3.2.6 Phase 1 of the proposed penetration modification can be completed prior to cold shutdown since the welded cap assembly inside containment is not affected. This welded cap assembly ensure that containment integrity is maintained and can be considered an extension of the containment liner (see Section 3,2 of reference 2.5). The penetration is also required to be tested under 10 CFR 50 Appendix J testing criteria prior to initiation of work to verify the integrity of the welded cap assembly inside containment (section 1.1.5 of the Design Criteria).

4.0 Preliminary Safety Evaluation

4.1 The probability of occurrence or the consequences of an accident or malfunction of equipment important to safety, previously evaluated in the Safety Analysis Report are not increased.

4.2 The possibility of an accident or malfunction of a type different from any previously evaluated in Safety Analysis Report has not been created.

4.3 The margins of safety as defined in the basis for any technical specification is not reduced.

4.4 Therefore, the proposed modification does not involve an unreviewed safety question. No changes to the Technical Specifications are required as the result of the proposed modification to maintain the present margins of safety.