December 30, 1981

Docket No. 50-244
LS05-81- 12-101

Mr. John E. Maier, Vice President
Electric and Steam Production
Rochester Gas & Electric Corporation
89 East Avenue
Rochester, New York 14649

SEE Rpts.
#8201110007

Dear Mr. Maier:

SUBJECT: SYSTEMATIC EVALUATION PROGRAM TOPIC III-7.B, DESIGN CODES, DESIGN CRITERIA, AND LOADING COMBINATIONS - R. E. GINNA

Enclosed is a copy of our draft evaluation of SEP Topic III-7.B and our contractor's reports which form the basis for our SER.

You are requested to examine the facts upon which the staff has based its evaluation and respond either by confirming that the facts are correct or by identifying errors and supplying the corrected information. The SER identifies areas of codes where changes have occurred to decrease margins of safety. It also identifies possible liner plate integrity problems due to a thermal discontinuity. You should review how these codes were applied in the design of Ginna and assess the safety margins where code changes have been identified as potentially significant. We encourage you to supply any other material that might affect the staff's evaluation or be significant in the integrated assessment of your facility.

Your response to the liner plate integrity problem is requested in 30 days.

Sincerely,

Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing

Add: Alan Wang

SE04
S/1

DSU USE EX(07)

Enclosure:
As stated

cc w/enclosure:
See next page

OFFICE	SEPB:DL	SEPB:DL	SEPB:DL	ORB#5:PM	ORB#5:BC	AD:SA:DL	
SURNAME	DPersinko:dk	RHermann	WRussell	JLyons	DCrutchfield	GLainas	
DATE	12/29/81	12/29/81	12/29/81	12/29/81	12/30/81	12/30/81	

Mr. John E. Maier

cc
Harry H. Voigt, Esquire
LeBoeuf, Lamb, Leiby and MacRae
1333 New Hampshire Avenue, N. W.
Suite 1100
Washington, D. C. 20036

Mr. Michael Slade
12 Trailwood Circle
Rochester, New York 14618

Ezra Bialik
Assistant Attorney General
Environmental Protection Bureau
New York State Department of Law
2 World Trade Center
New York, New York 10047

Resident Inspector
R. E. Ginna Plant
c/o U. S. NRC
1503 Lake Road
Ontario, New York 14519

Director, Bureau of Nuclear
Operations
State of New York Energy Office
Agency Building 2
Empire State Plaza
Albany, New York 12223

Rochester Public Library
115 South Avenue
Rochester, New York 14604

Supervisor of the Town
of Ontario
107 Ridge Road West
Ontario, New York 14519

Dr. Emmeth A. Luebke
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dr. Richard F. Cole
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

U. S. Environmental Protection Agency
Region II Office
ATTN: Regional Radiation Representative
26 Federal Plaza
New York, New York 10007

Herbert Grossman, Esq., Chairman
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

SYSTEMATIC EVALUATION PROGRAM
TOPIC III-7.B

R. E. GINNA

TOPIC: III-7.B, DESIGN CODES, DESIGN CRITERIA AND LOADING COMBINATIONS

I. INTRODUCTION

SEP plants were generally designed and constructed during the time span from the late 1950's to late 1960's. They were designed according to criteria and codes which differ from those accepted by the NRC for new plants.

The purpose of this topic is to assess the safety margins existing in Category I structures as a result of changes in design codes and criteria.

II. REVIEW GUIDELINES

The current licensing criteria which governs the safety issue in this topic is 10 CFR 50, Appendix A, GDC 1, 2, and 4 as interpreted by Standard Review Plan 3.8.

III. RELATED SAFETY TOPICS

The following SEP topics are related to III-7.B:

1. III-2, Wind and Tornado Loadings
2. III-3.A, Effects of High Water and Level on Structures
3. III-4.A, Tornado Missiles
4. III-5.A, Effects of High Energy Pipe Breaks Inside Containment
5. III-5.B, Effects of High Energy Pipe Breaks Outside Containment
6. III-6, Seismic Design Considerations
7. VI-2.D, Mass and Energy Release for Postulated Pipe Break Inside Containment

IV. EVALUATION

The evaluation is based on a Technical Evaluation Report (TER) prepared by the Franklin Research Center (FRC) in conjunction with the NRC staff through contract. The report is entitled, "Design Codes, Design Criteria and Loading Combinations" and is attached to this Safety Evaluation Report as Enclosure (1).

We have compared structural design codes employed in the design of Category I structures at Ginna to present codes. This was done through generic code versus code comparison without investigating specifically how the original code was applied to the Ginna design; however, after reviewing drawings of structures at Ginna, we concluded that certain portions of the codes were not applicable to Ginna because the types of structures to which the codes are referring were non-existent at Ginna. We have compared the loads and loading combinations employed in the design of Ginna as described in the Ginna FSAR to those required today.

A result of these comparisons is that a number of code changes could potentially impact significantly margins of safety (denoted by scale A and Ax in Enclosure 1). This can be attributed to several factors such as:

1) New codes have imposed stricter limitations than old,

2) New codes have included sections governing design of certain types of structures which were not included in the older codes,

3) Design loads required today were not included in the plant design, and

4) Certain load combinations judged to be significant were not included in plant design.

In Enclosure (1), some items have been judged to potentially impact margins of safety regarding the containment as a result of comparing ACI 318-63 to ASME BPV Section 3, Division 2. These items are discussed in Section 11 of the report. One item, cc-3421.5 of the BPV Code, Section III, Division 2, 1980, is not significant based upon the additional information contained in Enclosure (2).

The code changes of concern from Enclosure (1) are: (See next page)

Structural Elements to be Examined	Code Change Affecting These Elements: New Code	Old Code
Beams	AISC 1980	AISC 1963
a. Composite Beams		
1. Shear connectors in composite beams	1.11.4	1.11.4
2. Composite beams or girders with formed steel deck	1.11.5	--*
b. Hybrid Girders		
Stress in flange	1.10.6	1.10.6
Compression Elements	AISC 1980	AISC 1963
With width-to-thickness ratio higher than specified in 1.9.1.2	1.9.1.2 and Appendix C	1.9.1
Tension Members	AISC 1980	AISC 1963
When load is transmitted by bolts or rivets	1.14.2.2	--
Connections	AISC 1980	AISC 1963
a. Beam ends with top flange coped, if subject to shear	1.5.1.2.2	--
b. Connections carrying moment or restrained member connection	1.15.5.2 1.15.5.3 1.15.5.4	--

*Double dash (--) indicates that no provisions were provided in the older code.

Structural Elements to be Examined	Code Change Affecting These Elements New Code	Old Code
Members Designed to Operate in an Inelastic Regime	AISC 1980	AISC 1963
Spacing of lateral bracing	2.9	2.8
Short Brackets and Corbels having a shear span-to-depth ratio of unity or less	ACI 349-76 11.13	ACI 318-63 --
Shear Walls used as a primary load-carrying member	ACI 349-76 11.16	ACI 318-63 --
Precast Concrete Structural Elements, where shear is not a member of diagonal tension	ACI 349-76 11.15	ACI 318-63 --
Concrete Regions Subject to High Temperatures	ACI 349-76	ACI 318-63
Time-dependent and position-dependent temperature variations	Appendix A	--
Columns with Spliced Reinforcement	ACI 349-76	ACI 318-63
subject to stress reversals; f_y in compression to 1/2 f_y in tension	7.10.3	805
Steel Embedments used to transmit load to concrete	ACI 349-76 Appendix B	ACI 318-63 --
Containment and Other Elements, transmitting In-plane shear	B&PV Code Section III, Div. 2, 1980 CC-3421.5	ACI 318-63 --
Region of shell carrying concentrated forces normal to the shell surface (see case study 13 for details)	B&PV Code, Section III, Div. 2, 1980 CC-3421.6	ACI 318-63 1707

Structural Elements to be Examined	Code Change Affecting These Elements	
	New Code	Old Code
Region of shell under torsion	B&PV Code Section III, Div. 2, 1980 CC-3421.7	ACI 318-63 921
Elements Subject to Biaxial Tension	B&PV Code, Section III, Div. 2, 1980 CC-3532.1.2	ACI 318-63 --
Brackets and Corbels	B&PV Code, Section III, Div. 2, 1980 CC-3421.8	ACI 318-63 --

Section 10 of Enclosure (1) address load and load combination changes which occurred as a result of code changes and identifies specific plant structures for which various load combinations may be significant. Based upon a lack of detailed information on the stress results for loads and load combinations used during design of structures at Ginna, these loads and load combinations may be potentially significant.

Enclosure (2) provides details of a reanalysis of the containment for combined seismic and LOCA loadings which was performed by our contractor, Lawrence Livermore Laboratory. A major conclusion contained in Enclosure (2) is that the thermal discontinuity which exists in the liner plate at the point where the insulation stops results in high thermal stress for postulated LOCA temperatures and could result in liner buckling or failure. The discontinuation of the insulation creates a force imbalance in the liner plate due to unequal thermal expansion and possible loss of liner plate integrity. Further analyses may be performed if the results of Topic VI-2.D change significantly from those assumed in Enclosure (2).

V. CONCLUSIONS

We conclude that after comparing design codes, criteria, loads and load combinations, a number of changes have occurred which could potentially impact margins of safety. These changes are identified above. These differences between plant design and current licensing criteria should be resolved as follows:

1) Review Seismic Category 1 Structures at Ginna to determine if any of the structural elements for which a concern exists are a part of the facility design of Ginna. For those that are, assess the impact of the code changes on margins of safety on a plant specific basis, and

2) Examine on a sampling basis the margins of safety of Seismic Category 1 structures for loads and load combinations not covered by another SEP topic and denoted by Ax in Enclosure (1).

Regarding the ability of the Ginna containment to resist the seismic and LOCA loads described in Enclosure (1) modifications are required to prevent possible loss of liner plate integrity.

GINNA SER ADDENDA - SEP TOPIC III-7.B

To be inserted before Section 10.2 in FRC report:

Current criteria require consideration during plant design of thirteen load combinations for most structures, as shown in the load combination tables. These specific requirements were not in effect at the time when SEP plants were designed. Consequently, other sets of load-combinations were used. In comparing actual and current criteria, an attempt was made to match each of the load combinations actually considered to its nearest counterpart under present requirements. For example, consider a plant where the SSE was addressed in combination with other loads, but not in combination with the effects of a LOCA (load combination 13). The load combination tables would reflect this by showing that load case 9 was addressed, but that load case 13 was not. If six load cases were considered, only six (nearest counterpart) load cases are indicated in the table---not partial fulfillment of all 13.

The scale rankings assigned to loads and load combinations in tables are intended as an appraisal of plant status, with respect to demonstration of compliance with current design criteria, based on information available to the NRC prior to the inception of the SEP review. A number of structurally related SEP topics review some loads and load combinations in detail based upon current calculational methods. In order that a consistant basis for the tables be maintained, they are based upon load combination considered in the original design of the facility, or in the case of facility modifications, they are based upon the combinations used in the design of the modification. Loads which were not included in the original design or have increased in magnitude and have not been specifically addressed in another SEP topic should be addressed by the licensee.