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July 26, 1979

Mr. Boyce H. Grier, Director
U.S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region I
631 Park Avenue
King of Prussia, PA 19406

Subject: Supplemental Response
IE Bulletin No. 79-07
Seismic Stress Analysis of Safety-Related Piping
R. E. Ginna Nuclear Power Plant, Unit No. 1
Docket No. 50-244

Dear Mr. Grier:

On April 25, 1979 we provided you with a response to the subject IE Bulletin. During subsequent discussions with members of the Region 1, IE Headquarters, and DOR Staff we have been requested to provide additional information concerning our initial response. Enclosed is a copy of the information requested.

Very truly yours,

L. D. White, Jr.

L. D. White, Jr.

Enclosure

xc: U.S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Division of Reactor Operations Inspection
Washington, DC 20555

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Revised Response to IE Bulletin No. 79-07
Seismic Stress Analysis of Safety Related Piping
R.E. Ginna Nuclear Power Plant, Unit No. 1
Docket No. 50-244

1. The sections of the A residual heat removal, B main steam, and charging system piping originally analyzed using computer programs which contained algebraic summation of intra-modal responses have been reanalyzed. The reanalyses have been performed by Westinghouse using the computer code WESTDYN which combines intra-modal responses absolutely. A detailed description of the reanalysis techniques and the results are contained in Attachment 1.

2. Pipe break locations at Ginna Station were not selected based on stress. Therefore, the new stress analyses do not affect the evaluation of this event.

3. None of the 3 lines reanalyzed contains any of the Velan check valves involved in the incorrect weight problem identified in IE Bulletin 79-04.

4. The support loads obtained in the reanalyses did not exceed the allowable loads for the existing supports. Therefore, reanalysis of the supports was not required.

5. The reanalyses were based on as-built piping system isometrics and support information. The only inconsistencies found on these lines between the as-built condition and the design drawings were minor differences in support location.

Attachment 1
Revised Response to IE Bulletin No. 79-07
Seismic Stress Analysis of Safety Related Piping
R.E. Ginna Nuclear Power Plant, Unit No. 1
Docket No. 50 244

Supplementary information to NRC Bulletin 79-07 is provided herein for the Robert Emmett Ginna Nuclear Generating Station, Unit 1. Information is provided for:

1. Residual heat removal line - Loop A
2. Main Steam Line - Loop B
3. Charging Line

The defined piping/support systems which are analyzed are evaluated incorporating three-dimensional static and dynamic models which include the effects of the supports, valves and equipment. The static and dynamic analysis employs the displacement method, lumped parameters, stiffness matrix formulation and assumes that all components and piping behave in a linear elastic manner. The response spectra modal analysis technique is used to analyze the piping. The 1/2% Housner ground response spectrum is employed with zero period acceleration values of 0.08g and 0.2g for the OBE and SSE respectively. This is consistent with the FSAR. The stress intensification factors due to welds are included in the reanalysis.

1. Residual Heat Removal Line - Loop A

The line analyzed is the residual heat removal system line from the anchor near reactor coolant Loop A to the containment penetration. In Table 1 is a comparison of stresses obtained from ADLPIPE and WESTDYN. In Column 1 are the results from the 1969 analysis which contained the algebraic sum of intra-modal responses. In order to have a common basis of comparison, the model employed in 1969 was reanalyzed using the Westinghouse proprietary computer code, WESTDYN. Results are shown in Columns 2 and 3, where the results are combined absolutely and algebraically. It should be noted that there was no difference in the support load between algebraic and absolute intra-modal combinations. The stress results reported are obtained using B 31.1-1967, Formula 8. There is not much difference in the stress results reflecting algebraic and absolute intra-modal combinations.

In Table 2 is a comparison of stress results for the 1969 model, and the model reflecting as-built conditions. It should be noted that the 1969 model considered rigid supports, whereas the reanalysis considers both as-built conditions and support stiffnesses. The stress results reported are obtained using B 31.1-1973 Summer Addenda, Formula 12. Stress allowables given are based on the stress limits given in Appendix 4A, Table 1, of the FSAR.

The analysis reflecting the as-built conditions and support stiffnesses result in support loads below the allowable limits. This is seen in Table 3. The line is seismically qualified.

TABLE 1

SUMMARY OF MAXIMUM RHR-LOOP A SEISMIC STRESSES ("SSE")*

UNITS-PSI

SHOCK DIRECTIONS	1969 ADLPIPE	1979 WESTDYN**	1979 WESTDYN***
	(1)	(2)	(3)
Vertical + Z-Horizontal	11,602	11,224	11,083
Vertical + X-Horizontal	5,988	5,039	4,992

SUMMARY OF MAXIMUM RHR LOOP A COMBINED STRESSES*

UNITS-PSI

COMBINE STRESS	1969 ADLPIPE	1979 WESTDYN**	1979 WESTDYN***	ALLOWABLE STRESS
	(1)	(2)	(3)	(4)
Maximum Potential Earthquake ("SSE") + Normal Pressure + Deadweight	17,750	17,375	17,235	28,620

* Results are based on a piping system model representing the 1969 model which considers supports rigid.

** Seismic modal results combined absolutely.

*** Seismic modal results combined algebraically.

TABLE 2

RHR-LOOP A STRESS SUMMARY

UNITS-PSI

Description	1969 Model* Condition	As-Built** Condition	Allowable Stress
Seismic Stresses			
OBE			
Vertical + Z-Horizontal	-	3,356	-
Vertical + X-Horizontal	-	3,900	-
SSE			
Vertical + Z-Horizontal	10,564	8,284	-
Vertical + X-Horizontal	5,674	9,716	-
Combined Stresses			
OBE + Pressure + Deadweight	-	9,436	19,080
SSE + Pressure + Deadweight	16,715	15,252	28,620

* Results obtained using WESTDYN and 1969 model which considers the supports rigid.

** Results obtained using WESTDYN and as-built conditions considering support stiffnesses.

TABLE 3
RHR-LOOP A SUPPORT LOADS*
UNITS-POUNDS

Supports	Description	As-Built Conditions	Design Load
RH-34 Vertical	OBE		
	Vertical + Z-Horizontal	2820	3600
	Vertical + X-Horizontal	2720	
	SSE		
	Vertical + Z-Horizontal	3370	5400
	Vertical + X-Horizontal	3110	
RH-8 Vertical	OBE		
	Vertical + Z-Horizontal	1110	1680
	Vertical + X-Horizontal	1260	
	SSE		
	Vertical + Z-Horizontal	1340	2520
	Vertical + X-Horizontal	1680	
RH-7 Vertical	OBE		
	Vertical + Z-Horizontal	1080	2160
	Vertical + X-Horizontal	1090	
	SSE		
	Vertical + Z-Horizontal	1200	3240
	Vertical + X-Horizontal	1220	
RH-6 Horizontal	OBE		
	Vertical + Z-Horizontal	990	5640
	Vertical + X-Horizontal	860	
	SSE		
	Vertical + Z-Horizontal	2390	8460
	Vertical + X-Horizontal	2030	

*Support load combination is seismic plus deadweight.

TABLE 3 (Cont'd)
RHR-LOOP A SUPPORT LOADS*
UNITS-POUNDS

Supports	Description	As-Built Conditions	Design Load
RH-5 Vertical	OBE		
	Vertical + Z-Horizontal	740	2160
	Vertical + X-Horizontal	740	
	SSE		
	Vertical + Z-Horizontal	930	3240
	Vertical + X-Horizontal	930	
RH-4 Horizontal	OBE		
	Vertical + Z-Horizontal	600	3720
	Vertical + X-Horizontal	780	
	SSE		
	Vertical + Z-Horizontal	1390	5580
	Vertical + X-Horizontal	1850	
RH-3 Vertical	OBE		
	Vertical + Z-Horizontal	1910	2160
	Vertical + X-Horizontal	1880	
	SSE		
	Vertical + Z-Horizontal	2250	3240
	Vertical + X-Horizontal	2180	
RH-2 Vertical	OBE		
	Vertical + Z-Horizontal	1600	2160
	Vertical + X-Horizontal	1600	
	SSE		
	Vertical + Z-Horizontal	1920	3240
	Vertical + X-Horizontal	1930	

*Support load combination is seismic plus deadweight.

TABLE 3 (Cont'd)
RHR-LOOP A SUPPORT LOADS*
UNITS-POUNDS

Supports	Description	As-Built Conditions	Design Load
RH-1 Vertical	OBE		
	Vertical + Z-Horizontal	1780	2160
	Vertical + X-Horizontal	1870	
	SSE		
	Vertical + Z-Horizontal	2200	3240
	Vertical + X-Horizontal	2420	
RH-1 Horizontal	OBE		
	Vertical + Z-Horizontal	324	3720
	Vertical + X-Horizontal	880	
	SSE		
	Vertical + Z-Horizontal	780	5580
	Vertical + X-Horizontal	2150	

*Support load combination is seismic plus deadweight.

2. Main Steam Line - Loop B

The line analyzed extends from steam generator 1B to the containment penetration. Seismic results were originally reported in AEC Docket No. 50-244, June 9, 1969 submittal pertaining to seismic design of Class I piping. The dynamic stress results were obtained using the computer code ADLPIPE which contained algebraic summation of intra-modal responses. A seismic reanalysis of this line has been performed using the Westinghouse proprietary computer code WESTDYN which combines intramodal results absolutely. It is not possible to directly compare the "old" and "new" dynamic seismic results since the old results are not available.

The WESTDYN dynamic model reflects the as-built conditions as well as the actual support stiffnesses. The main steam line analyzed was coupled to a reactor coolant loop B model. In Table 4 is a comparison of stress results from the reanalysis reflecting as-built conditions, support stiffnesses, and the allowable stresses. The stress results reported are obtained using B 31.1-1973 Summer Addenda, Formula 12. Stress allowables given are based on the FSAR stress limits given in Appendix 4A, Table 1. The support loads and steam generator nozzle loads compared to allowables are given in Table 5.

The line is qualified seismically.

TABLE 4

MAIN STEAM LINE-LOOP B

STRESS SUMMARY*

UNITS - PSI

Description	AS-BUILT CONDITION	
	Dynamic* Results	Allowable Stress
Seismic Stresses		
OBE		
Vertical + Z-Horizontal	965	-
Vertical + X-Horizontal	963	-
SSE		
Vertical + Z-Horizontal	2373	-
Vertical + X-Horizontal	2238	-
Combined Stresses		
OBE + Pressure + Deadweight	7278	16,440
SSE + Pressure + Deadweight	8686	24,660

*Stresses given are obtained using B31.1-1973 Summer Addenda, Formula 12.

TABLE 5A

MAIN STEAM LINE LOOP BE SUPPORT LOADS*

UNITS-POUND

Seismic Supports	Description	As-Built Conditions	Design Load
MS-7	OBE		
	Vertical + Z-Horizontal	3040	21,000
	Vertical + X-Horizontal	6930	21,000
	SSE		
	Vertical + Z-Horizontal	6200	21,000
	Vertical + X-Horizontal	14060	21,000
MS-8	OBE		
	Vertical + Z-Horizontal	6140	21,000
	Vertical + X-Horizontal	5260	21,000
	SSE		
	Vertical + Z-Horizontal	15350	21,000
	Vertical + X-Horizontal	13240	21,000

TABLE 5B

MAIN STEAM LINE LOOP B STEAM GENERATOR*

NOZZLE LOADS

UNITS, KIPS, IN-KIPS

Description	WESTDYN LOCAL COORDINATE SYSTEM					
	FX	FY	FZ	MX	MY	MZ
OBE induced load	9	2	4	300	209	514
Seismic OBE allowable loads	150	150	150	5000	5000	5000
SSE induced loads	15	5	4	649	279	1160
Seismic SSE allowable loads	200	200	200	7500	7500	7500

*Support load combination is seismic plus deadweight.

3. Charging Line

The lines analyzed extend from charging pumps 1, 2 and 3 to the charging pump discharge filter; and include the 2 and 3 inch discharge lines from the filter, and the 3 inch bypass. A seismic analysis was originally performed of this line by the M.W. Kellogg Company. A seismic reanalysis of this line has been performed using the Westinghouse proprietary computer code WESTDYN which combines intramodal results absolutely.

The WESTDYN dynamic model reflects the as-built conditions as well as the actual support stiffnesses. In Table 6 is a comparison of stress results from the reanalysis reflecting as-built conditions, support stiffnesses, and the allowable stresses. The stress results reported are obtained using B 31.1-1973 Summer Addenda, Formula 12. Stress allowables given are based on the FSAR stress limits given in Appendix 4A, Table 1. The support loads compared to allowables are given in Table 7.

The line is seismically qualified.

TABLE 6

CHARGING LINE

STRESS SUMMARY*

UNITS - PSI

Description	As-Built Condition	Allowable Stress
	Dynamic Analysis	
Seismic Stresses		
OBE		
Vertical + Z-Horizontal	150	-
Vertical + X-Horizontal	245	-
SSE		
Vertical + Z-Horizontal	436	-
Vertical + X-Horizontal	638	-
Combined Stresses		
OBE + Pressure + Deadweight	6,941	20,580
SSE + Pressure + Deadweight	7,334	30,870

Stresses given are obtained using B31.1-1973 Summer Addenda Formula 12.

TABLE 7
CHARGING LINE SUPPORT LOADS*
UNITS-POUND

Supports	Description	As-Built Conditions	Design Loads
S-35 Vertical	OBE		
	Vertical + Z-Horizontal	570	1,500
	Vertical + X-Horizontal	580	
	SSE		
	Vertical + Z-Horizontal	620	2,250
	Vertical + X-Horizontal	600	
S-60 Vertical	OBE		
	Vertical + Z-Horizontal	20	1,500
	Vertical + X-Horizontal	20	
	SSE		
	Vertical + Z-Horizontal	30	2,250
	Vertical + X-Horizontal	30	
S-135 Vertical	OBE		
	Vertical + Z-Horizontal	40	8,850
	Vertical + X-Horizontal	40	
	SSE		
	Vertical + Z-Horizontal	40	12,750
	Vertical + X-Horizontal	40	
S-135 Axial	OBE		
	Vertical + Z-Horizontal	65	8,500
	Vertical + X-Horizontal	65	
	SSE		
	Vertical + Z-Horizontal	65	12,750
	Vertical + X-Horizontal	65	

*Support load combination is seismic plus deadweight.

TABLE 7(Cont'd)
CHARGING LINE SUPPORT LOADS
UNITS-POUND

Supports	Description	As-Built Conditions	Design Loads
S-145 Vertical	OBE		
	Vertical + Z-Horizontal	10	1,500
	Vertical + X-Horizontal	10	
	SSE		
	Vertical + Z-Horizontal	20	2,250
	Vertical + X-Horizontal	20	
S-210 Vertical	OBE		
	Vertical + Z-Horizontal	50	8,500
	Vertical + X-Horizontal	50	
	SSE		
	Vertical + Z-Horizontal	50	12,750
	Vertical + X-Horizontal	50	
S-210 Axial	OBE		
	Vertical + Z-Horizontal	65	8,500
	Vertical + X-Horizontal	65	
	SSE		
	Vertical + Z-Horizontal	65	12,750
	Vertical + X-Horizontal	65	
S-225 Vertical	OBE		
	Vertical + Z-Horizontal	10	1,500
	Vertical + X-Horizontal	10	
	SSE		
	Vertical + Z-Horizontal	20	2,250
	Vertical + X-Horizontal	10	

TABLE 7(Cont'd)
CHARGING LINE SUPPORT LOADS
UNITS-POUND

Supports	Description	As-Built Conditions	Design Loads
N 404 Horizontal (2 inch)	OBE		
	Vertical + Z-Horizontal	0	375
	Vertical + X-Horizontal	10	
	SSE		
	Vertical + Z-Horizontal	10	562
	Vertical + X-Horizontal	10	
N 404 Horizontal (3 inch)	OBE		
	Vertical + Z-Horizontal	40	375
	Vertical + X-Horizontal	40	
	SSE		
	Vertical + Z-Horizontal	50	562
	Vertical + X-Horizontal	60	
N 405 Vertical (2 inch)	OBE		
	Vertical + Z-Horizontal	90	500
	Vertical + X-Horizontal	90	
	SSE		
	Vertical + Z-Horizontal	100	750
	Vertical + X-Horizontal	100	

TABLE 7(Cont'd)
CHARGING LINE SUPPORT LOADS
UNITS-POUND

Supports	Description	As-Built Conditions	Design Loads
N 405 Horizontal (2 inch)	OBE		
	Vertical + Z-Horizontal	20	150
	Vertical + X-Horizontal	20	
	SSE		
	Vertical + Z-Horizontal	30	225
	Vertical + X-Horizontal	30	
N 405 Horizontal (3 inch)	OBE		
	Vertical + Z-Horizontal	210	1,150
	Vertical + X-Horizontal	210	
	SSE		
	Vertical + Z-Horizontal	230	1,725
	Vertical + X-Horizontal	230	
N 405 Horizontal (3 inch)	OBE		
	Vertical + Z-Horizontal	70	400
	Vertical + X-Horizontal	70	
	SSE		
	Vertical + Z-Horizontal	80	600
	Vertical + X-Horizontal	80	