One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

January 5, 1981

Mr. James G. Keppler, Director
Directorate of Inspection and
Enforcement - Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2
Additional Response Concerning
IE Bulletin 79-14
NRC Docket Nos. 50-237/249
and 50-254/265

Dear Mr. Keppler:

This letter is to respond to several open items which were discussed in the December 9, 1980 meeting in the NRC Offices in Bethesda, Maryland, and are identified below:

1. Presentation of revised initial acceptance allowables for combined piping system stresses during an SSE event.

2. Presentation of initial acceptance allowables for combined pipe support stresses during an SSE event.

3. Criteria for converting problems analyzed by the Blume alternate analysis criteria to computer analysis.

4. Justification for qualifiying all piping previously analyzed to the original project acceptance criteria.

Our response to each of the open items is provided in Attachment 1.

Please address any questions concerning this matter to this office.

Very truly yours,

Robert F. Janecek

Robert F. Janecek
Nuclear Licensing Administrator
Boiling Water Reactors

[illegible]

[illegible] - Dresden
[illegible] Inspector - Quad Cities

[illegible]

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Attachment 1

Revised Initial Acceptance Criteria for Piping Systems

The revised initial acceptance criteria are based on recent EDS Nuclear evaluations of selected systems where hand-evaluated stresses exceed the original project acceptance criteria. These refined evaluations included:

1. Comparative studies of all systems having excessive calculated stresses to determine the "worst case" systems and categorization of all systems so that one or more "worst case" systems envelop the remaining systems.

2. Refined linear analysis on the "worst case" system. The refinements have included use of Response Spectra dynamic analysis, modelling of all piping including attached non-safety related piping and usage of more appropriate damping values.

3. Nonlinear analysis of the "worst case" system in order to determine a more realistic assessment of the margin of safety than exists in the original project acceptance criteria and how that margin can be used as the basis for revised criteria.

Based on these evaluations and review of all systems in the Quad Cities Unit 1 plant, EDS has developed revised initial acceptance criteria which are consistent with the discussions held between Commonwealth Edison, EDS and the NRC on December 9, 1980.

The basic criterion that EDS intends to utilize for piping analysis is as follows:

$$\sigma_{SSE} + \sigma_g + \sigma_p < 2\sigma_y$$

for all carbon steel piping. The criteria for stainless steel differ slightly and are established as follows:

$$1.\ \sigma_{SSE} + \sigma_g < 2\sigma_y$$

As assurance that a buckling mode will not occur and hence prevent flow, and

$$2.\ \sigma_{SSE} + \sigma_g + \sigma_p < 2.2\sigma_y$$

[illegible] that structural integrity is maintained [illegible] will not occur.

IMPELL

Record of Conversation

File: 0590-144

Copy: FSStoller
JCMinichiello
RWheaton
AHo
RMirochna
SJavidan
TTWittig

___Telephone ✓ Meeting ___Other

To: NRC Staff (See enclosed attendance list) From: CECo and Impell

Company: Commonwealth Edison Phone No.: Date: 5/13/86

Subject: Dresden, Quad Cities, and LaSalle Piping Criteria and Methodologies

Summary of Conversation:

The NRC Staff requested this meeting to discuss piping criteria and methodologies for the subject plants. Relative the D/QC, the purpose of the meeting was to discuss appropriate criteria for evaluating loads on the Recirc. System pump snubbers. Included in the D/QC discussions were CECo's September 1985 submittal which contained a proposed set of comprehensive and consistent criteria for piping systems.

For LaSalle, the principal topic was criteria for the snubber reduction program at Units 1 and 2.

Handouts from the meeting are attached. Conclusions and resolutions are listed below:

- The NRC voiced several reservations about using PVRC (ASME Code Case N-411). In no particular order of importance, they were: (1) use on older plants like Dresden and Quad; (2) use with IGSCC susceptable piping; (3) use with older methodologies; (4) use with older seismic input; (5) use with OBE. Each of these issues is still under review by the Staff.
- No NRC decision on D/QC. BD Liaw, BWR Chief of Engineering, adamately insisted that there could be no resolution on criteria independent of the SEP issues on D2. As a result, it was suggested that CECo prepare a revised criteria which integrated SEP. This was left unresolved.
- In response to our table which showed a comparison between FSAR and submittal techniques (both using PVRC damping), the Staff expressed concern with certain methods which were not addressed

The calculation of stresses due to an SSE will be made using a damping value of 2% which is more suitable for such an event and is supported by R.G. 1.60. It is further supported by the refined linear analysis that we have performed.

The second criterion adopted for stainless steel piping is appropriate for the following reasons:

1. Yield properties for stainless steel are at least 10% greater than those listed in the code.

2. There is a far greater margin between ultimate strength and yield strength for stainless steel. This justifies the distinction between a strain limiting criterion, tied to twice yield stress and integrity criterion, tied to ultimate stress. Since the pressure stress contributes to the latter type of failure, but not the former, it should be included in the latter only.

Initial Acceptance Criteria for Pipe Supports

Stress/load limits used as pipe support acceptance criteria for existing supports are attached as Appendix I. Also included for reference are criteria in effect for new designs added to satisfy FSAR criteria as part of the 79-14 effort.

Conversion of Blume Curve Analysis to Computer Analysis

The EDS criteria for conversion of Blume curve analysis to computer analysis has to this time been based solely on economic considerations. When computer analysis showed potential for a significant reduction in the number of required piping supports, it was used. On this basis, there were only two families of problems which were not converted to computer analysis:

1. Lines where two or less additional supports are required at intermediate locations:

Henceforth, these problems will be evaluated first by hand calculation and then, if necessary, by computer analysis. This approach has reduced the number of required additional supports from that indicated by the Blume curves, in some cases to none.

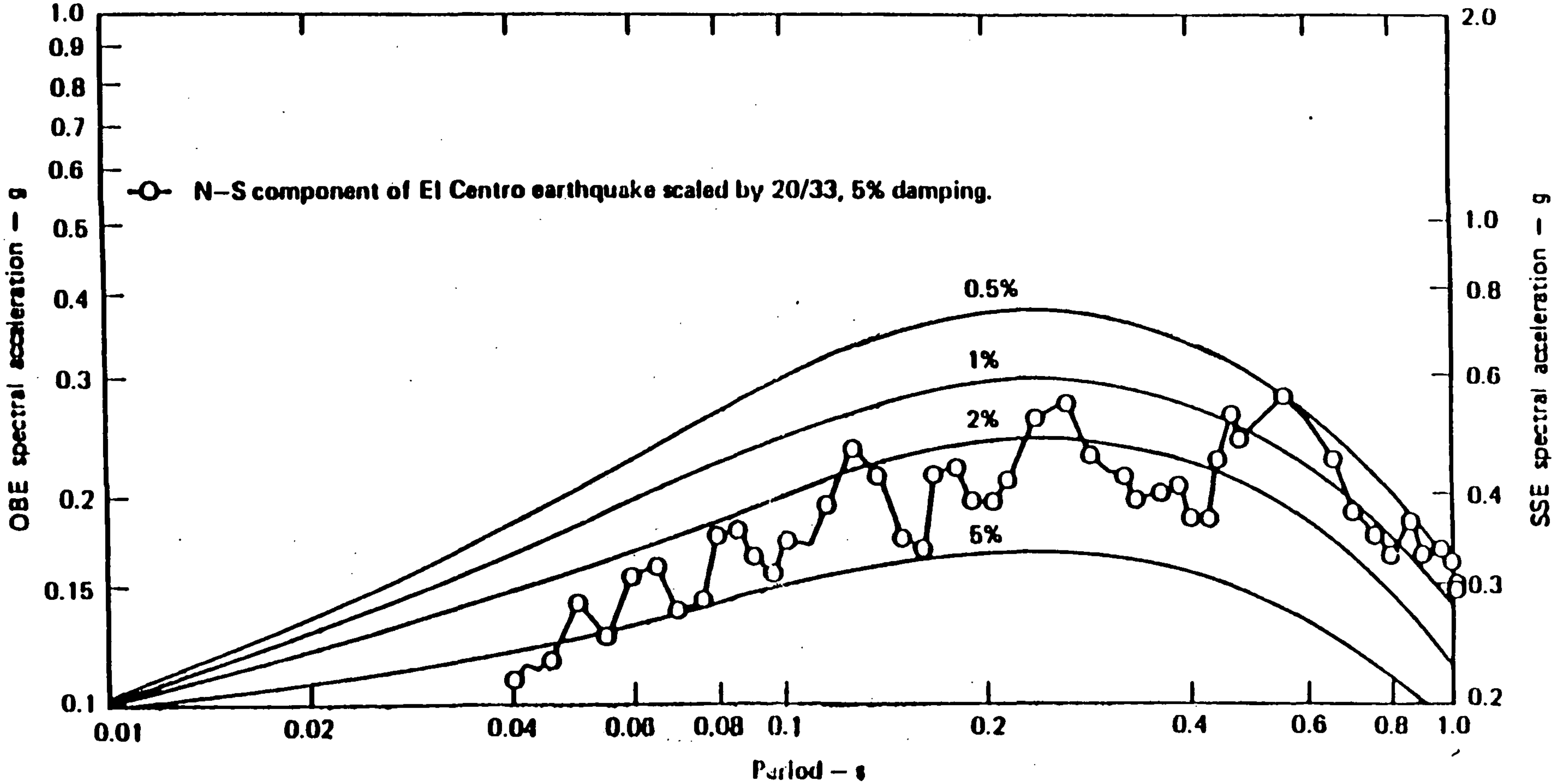

FIG. 4-3. Comparison of Housner design response spectra and response spectrum for El Centro earthquake, 5/18/40 N-S component (Source: Refs. 7 and 10).

NUREG/CR 1650

in the FSAR, such as consideration of missing mass. They were also concerned about the combination of two directions of earthquake which is the FSAR's directional combination method.

- The Staff recommended an alternative to the submittal methods. They suggested that RG 1.61 damping be used with FSAR techniques. CECo agreed to use this technique to reevaluate the D2 pump snubbers. If this approach was insufficient, the Staff recommended further discussions.

- On LaSalle, the Staff rejected most of the proposed techniques. They did provide authorization for PVRC damping and for some reevalution of load combinations. The latter required a safety evaluation (50.59).

- CECo received tentative authorization from R. LaGrange to use direct generation techniques to develop in-structure spectra for additional damping values.

Action items resulting from this meeting were:

1. Impell to reanalyze the Recirculation System pump snubbers for Dresden Unit 2 using RG 1.61 damping with FSAR techniques. Needed spectra will be developed using direct generation techniques. Impell agreed to complete D2 on 5/14.

2. Impell should be prepared to discuss why 79-14 did not identify the dimensional verification decrepancies noted during the walkdowns in 1985 which ultimately led to the issuance of the September submittal. Impell agreed to be ready on 5/14.

3. Impell to be prepared to discuss why 79-14 did not address the Recirc. Pump supports. Impell agreed to be prepare on 5/14.

3. Nonlinear analysis of the "worst case" system in order to determine a more realistic assessment of the margin of safety than exists in the original project acceptance criteria and how that margin can be used as the basis for revised criteria.

Based on these evaluations and review of all systems in the Quad-Cities Unit 1 plant, EDS has developed revised initial acceptance criteria.

The basic criterion that EDS uses for piping analysis is as follows:

$$\sigma_{SSE} + \sigma_g + \sigma_p < 2\sigma_y$$

for all carbon steel piping. The criteria for stainless steel differ slightly and are established as follows:

1. $\sigma_{SSE} + \sigma_g < 2\sigma_y$

As assurance that a buckling mode will not occur and hence prevent flow, and

2. $\sigma_{SSE} + \sigma_g + \sigma_p < 2.2\ \sigma_y$

The calculation of stresses due to an SSE will be made using a damping value of 2% which is more suitable for such an event and is supported by R.G. 1.60. It is further supported by the refined linear analysis that we have performed.

The second criterion adopted for stainless steel piping is appropriate for the following reasons:

1. Yield properties for stainless steel are at least 10% greater than those listed in the code.

2. There is a far greater margin between ultimate strength and yield strength for stainless steel. This justifies the distinction between a strain limiting criterion, tied to ultimate stress. Since the pressure stress contributes to the latter type of failure, but not the former, it should be included in the latter only.

This curve is the upper curve shown in Figure 12.1.1:2. Since the unsmoothed curve is generated from the time-history record and the smooth response spectrum curve has lower accelerations for nearly all periods, it is concluded that the time-history method tends to over-estimate the response when compared to the design criteria (smooth response spectrum). It is reiterated that the two methods of analysis used at Dresden were the time history and the smooth response spectrum, and it is our firm opinion that the responses calculated by these methods are conservative.

The seismic consultant prepared the acceleration response spectrum curves shown in Figures 12.1.1:3 and 12.1.1:4 based upon a ground acceleration of 0.1g. The seismic design of Class I structures and equipment was based upon a dynamic analysis using these curves. The natural periods of vibration were calculated for buildings which are vital to the proper shutdown of the plant. The following damping factors were used for strong vibrations within the elastic limit:

Item	% of Critical Damping
Reinforced Concrete Structures	5.0
Steel Frame Structures	2.0
Welded Assemblies	1.0
Bolted and Riveted Assemblies	2.0
Vital Piping Systems	0.5

For the design of Class I structures and equipment the maximum horizontal acceleration and the maximum vertical acceleration were considered to act simultaneously. Where applicable the resulting seismic stresses for the two motions were combined linearly. The vertical acceleration assumed was equal to 0.067g, 2/3 the horizontal ground acceleration.

To assure that the plant can be shut down with containment and heat removal facilities intact, Class I structures have been designed to accommodate a ground motion of 0.2g. Care was taken to assure that structures will not fail in a brittle manner.

The results of the seismic analysis were used in the design of the associated Class I structures, systems, and components. For the seismic analysis of equipment absolute acceleration is used at the points of support. Where a dynamic analysis was not performed the horizontal seismic coefficients for rigid Class I equipment in the reactor turbine building are equal to or greater than the building acceleration at the installed elevation. The vertical seismic coefficient is equal to 2/3 ground acceleration or 0.067g. Flexible and rigid Class I piping systems are analyzed as described in section 12.1.2.4.

Piping Criteria and Methodologies
Dresden, Quad Cities, and LaSalle
May 13, 1986

Attendees:

R. Gilbert	NRC/DBL/BWD#1
M. Turrak	CECo - Nuclear Licensing
R. Wheaton	Impell
J. Minichiello	Impell
S. Javidan	CECo - SNED
J. Wojnarowski	CECo - Nuclear Licensing
T. Wittig	Impell
C. Allen	CECo - Nuclear Licensing
A. Bournia	NRC/DBL/BWD#3
Y. Li	NRC/DRL/EB
H. Shaw	NRC/DBL/EB
J. Fair	NRC/IE
R. LaGrange	NRC/NRR/DBL/EB
G. Bagchi	NRC/NRR/PWRA/EB
R. Riggs	NRC/NRR/PWRA/EB
B. Liaw	NRC/NRR/DBL/EB
E. Adensam	NRC/NRR/DBL/BWD3
D. Farrar	CECo - Nuclear Licensing
G. Kitz	Sargent & Lundy
R. Srinivasan	CECo - Consultant/S. Levy, Inc.
J. Marianyi	CECo - SNED
J. Fox	CECo - SNED
R. Bosnak	NRC/DSRO/EIB
M. Hartzman	NRC/NRR/PWR-B/EB
G. Lainas	NRC/NRR/DBL
R. Bevan	NRC/NRR/DBL/BWD#1
J. Zwolinski	NRC/NRR/DBL/BWD#1
R. Bernero	NRC/NRR/DBL

Quad Cities Nuclear Station - Units 1 and 2
Dresden Nuclear Station - Units 2 and 3

Response to NRC Questions on the August, 1989,
Piping System Operability Criteria Licensing Submittal

Prepared for:

Nuclear Regulatory Commission

Prepared by:

Commonwealth Edison Company

TABLE OF CONTENTS

Section 1.0

INTRODUCTION

1.0 INTRODUCTION

The purpose of this document is to provide the responses and discussions as requested in the January 11, 1991 letter [1]. Where additional background information has been requested, details are provided in Section 2.0. Where alternative guidance has been suggested, additional discussions are given in Section 2.0 as well as specific changes to the Licensing Submittal, if necessary. A draft Licensing Submittal is given in Section 4.0 for your review.

Section 2.0

RESPONSES TO NRC QUESTIONS

2.1 The use of Regulatory Guide 1.61 damping with original design spectra and analysis procedures is not permitted. Either the FSAR damping should be used or the design spectra and analysis methods for use with current damping should be upgraded. (Section 3.1)

Response:

The use of Regulatory Guide 1.61 damping with the design spectra for operability evaluations was authorized by the NRC during the IEB 79-14 program as well as during the evaluation of the Reactor Recirculation pump snubbers in 1986 (see documentation attached).

The attached letter from R.F. Janacek (CECo) to J.G. Keppler (NRC) on January 5, 1981 [6], explains the background to the use of Regulatory Guide 1.61 damping. For the purposes of this discussion, there are additional references to support the use of R.G. 1.61 damping:

a. The spectra for the SSE load were obtained by multiplying the OBE spectra by 2, with no allowance for the higher damping in the structure during an SSE. Thus, the spectra used for analysis have additional conservatism since the higher damping during the SSE would lower the overall response.

b. The 0.5% damping used for piping was appropriate ".... for strong vibrations within the elastic limit." (Dresden UFSAR, page 12.1.1.-10, attached). This is reasonably consistent with the guidance given in Regulatory Guide 1.61, Position C.3. The proposed stress limit for the design earthquake is twice the elastic limit. Thus, the proposed stress limit supports the use of higher damping values. This is part of the background discussion to the attached 1/5/81 letter.

c. As noted in NUREG/CR-0891, "Seismic Review of Dresden Nuclear Power Station - Unit 2, For The Systematic Evaluation Program," [7] there was considerable margin between the response spectrum from the El Centro time history and the Housner design response spectrum (see Figure 4-3, attached) for periods above about .05 sec. The time history was used in the analysis of the reactor-turbine building.

These three points are presented only as additional references. The primary reason for the proposal of Regulatory Guide 1.61 damping is the prior acceptance based on evidence presented during the IEB 79-14 time frame.

2.2 The primary stress limits for normal and faulted condition loads exceed ASME Code (Code) allowables but are consistent with limits accepted by NRC for interim operation of other plants. However, secondary stress limits (e.g., on thermal stresses and seismic anchor motions) are not addressed. These limits should be defined and justifications provided if they exceed Code allowables. (Section 3.1)

Response:

The criteria will be revised to state that piping secondary stresses shall be evaluated against the existing FSAR/UFSAR allowables.

Note that the evaluation of piping secondary stresses will not include anchor motion (secondary stresses) due to earthquake. Since evaluation of the OBE load case is not part of the operability evaluation (see response to question 2.3), only the low probability SSE load case (one occurrence assumed per design) remains. Not including a one-time occurring load case in a secondary stress evaluation is consistent with current ASME philosophy.

Loads on supports due to SSE anchor motions will be included in the operability evaluation of the supports (see Section 4.0).

2.3 The criteria does not provide pipe stress limits for operating basis earthquake (OBE) and other occasional loads including waterhammer or steamhammer. These limits should be defined and if they exceed Code allowables, the actions that would be taken to assure continued operability should be explained. (Section 3.1)

Response:

The operability criteria does not provide pipe stress limits for OBE since limiting sustained plus SSE pipe stresses to $2S_y$ already ensures piping system operability and that safe shutdown can occur. This is because the SSE response spectra (at 2% damping) always envelopes the OBE response spectra (at 1% damping). The primary reason that SSE always envelopes OBE at their corresponding Regulatory Guide 1.61 damping values is that SSE originally was defined as twice OBE without allowance for the higher structural damping during as SSE (see response to question 2.1). As a further demonstration of this fact, the attached page A-12 from the Dresden Seismic Design Document has been marked-up to compare SSE at 2% damping to OBE at 0.5% damping. In this example, the SSE response spectra even envelopes the OBE response spectra at 0.5%.

The proposed operability criteria has been clarified with respect to other occasional loads such as waterhammer or steamhammer to require that they be combined with SSE (per FSAR/UFSAR load combinations) and the results shall be less than $2S_y$.

SARGENT & LUNDY ENGINEERS

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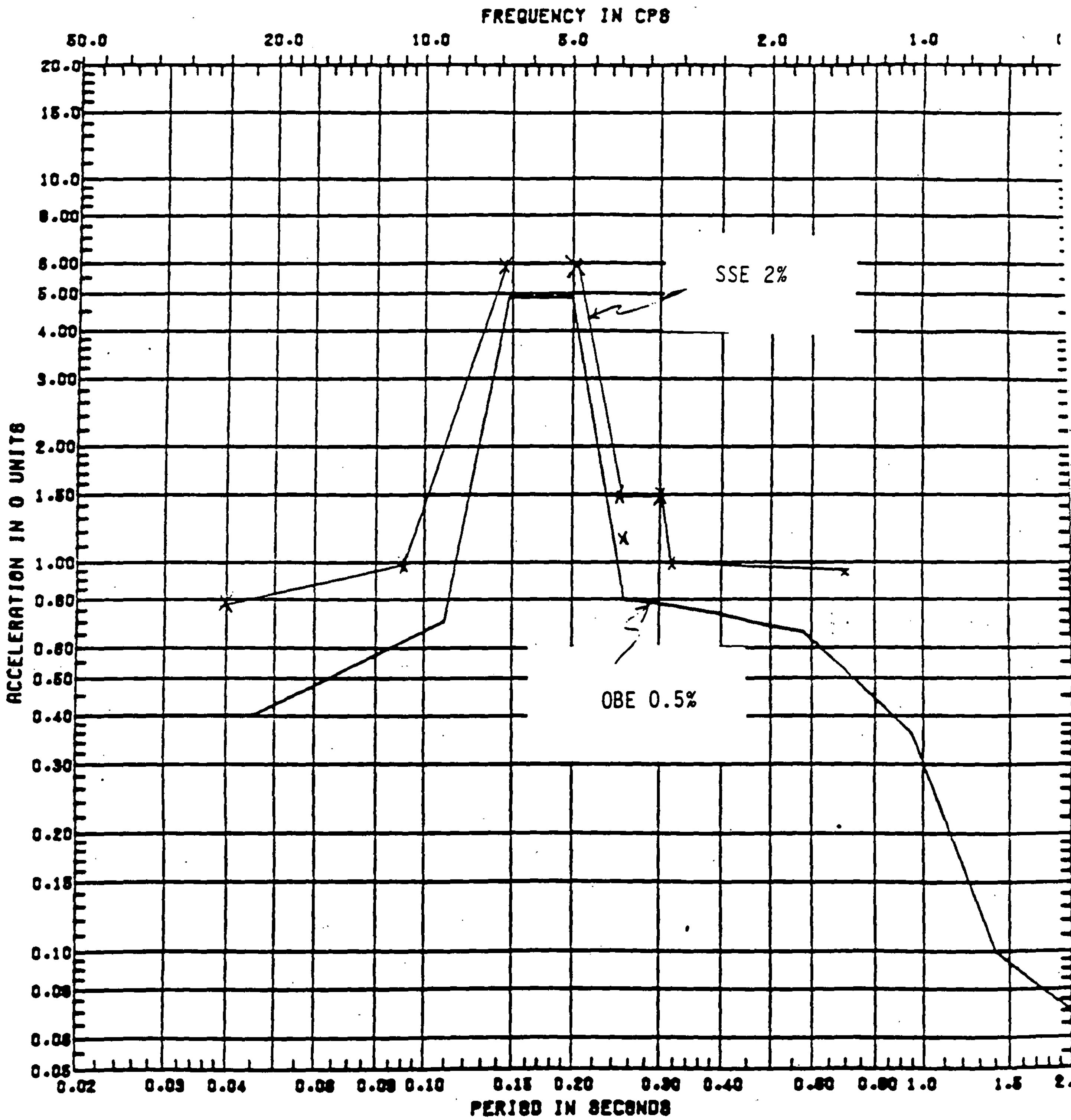
DC-SE-CO2-DR
REVISION 1
MARCH 31, 1987

CALC NO. 7355-E8-8 SAFETY RELAT
PROJECT DRESDEN UNITS 2&3
PROJECT NO. 7355
DAMPING 0.005
PAGE: A-12



SEISMIC SPECTRA - OBE

NODE 5

ELEVATION 589'-0"

DIRECTION N-S

LOCATION REACTOR BUILDING

2.4 The criteria for flanges needs to be clarified. If faulted condition limits will be applied to normal load combinations, further justification should be provided. (Section 3.2.1)

Response:

Flanges shall meet standard requirements of the piping codes referenced in the FSAR/UFSAR with the exception that OBE will not be included (see response to question 2.3). The criteria will be revised to clarify this point.

2.5 The licensee should provide the current design criteria for piping deflections and explain how it will ensure against interactions with adjacent structures when used in conjunction with the proposed operability criteria. (Section 3.2.2)

Response:

The current criteria for piping deflections is given in the attached page of the Quad Cities UFSAR [2] and the attached page of the Quad Cities FSAR [8]. Piping deflections less than 4 inches are considered acceptable with no further justification. For instances where the calculated deflections exceed these criteria, walkdowns shall be performed to determine if there is a potential for interactions with other plant items. If no potential interactions are found, this proposed piping operability criteria may be used. However, if interactions need to be evaluated, the evaluation of these interactions and the determination of piping operability is beyond the scope of these piping operability criteria.

For Class I systems, the boundaries of the piping system model used in the seismic analysis extends well beyond the stress analysis boundaries set by the first normally closed valves.

This is done to provide confidence that the dynamic loading influence of the Class I piping outside of (but attached to) the critical Class I portion of the system model is adequately accounted for.

Three systems were dynamically analyzed by GE consultants: the recirculation piping, and Class I portions of the main steam and the feedwater systems. The number of modes considered depends upon the particular system configuration. For the three systems, respectively, the number of modes utilized are six, seven, and twelve. The remaining Class I piping systems, 10 inches in diameter and larger, were dynamically analyzed by the architect-engineer using the response spectra method of dynamic analyses.

The dynamic response of the piping system was analyzed by the DYNAPIPE computer program (S&L Propietary Program). The program accounts for the effects of bending, shear, torsion, and axial deformations.

All dynamic analyses used 1/2-percent of critical damping for both the OBE and DBE except for the standby gas treatment system, where 1-percent of critical damping was used.

It is possible that seismic stresses may be relatively low in a system and the seismic deflections are large, i.e., on the order of 4 or more inches. When such is the case, clearances were checked to insure that the piping will not be damaged by striking any nearby structure, component, etc.

Vibrations

12.2.2.7 Piping Systems

The Class I piping systems, as noted previously, are analyzed to assure compliance with the criteria by one of two methods: dynamic or force-deflection curves. Dynamically analyzed systems utilize the computerized response spectra method. In this method the piping is modeled by a series of discrete masses interconnected by weightless springs. The system is then subjected to a translatory motion in each of the three mutually perpendicular directions of the global axis system. The program utilizes the appropriate floor response spectra to determine appropriate spectral accelerations after computation of the mode frequencies and shapes. One half percent damping factor is used on piping. For each mode the displacements and inertia forces are determined and the inertia forces of each mode are used as an external loading condition. The total combined modal results are obtained by taking the square root of the sum of the squares for each parameter, i.e., moments, shears, and displacements. In addition to the items noted, the computer program accounts for the effects of curved members and elbows by use of stress intensification factors which are functions of the pipe diameter, thickness, and bend radius.

Three systems were dynamically analyzed by GE consultants: the recirculation piping, and Class I portions of the main steam and the feedwater systems. The number of modes considered depends upon the particular system configuration. For the three systems, respectively, the number of modes utilized are six, seven, and twelve. The remaining Class I piping systems, 10 inches in diameter and larger, were dynamically analyzed by the architect-engineer using the response spectra method of dynamic analyses.

A more detailed discussion of the methods has been presented on the Dresden AEC Docket 50-237 and 50-249, Amendments 20 and 21. The method discussed as "Method II" in that reference is the method employed for all of the Quad-Cities dynamic analyses. Maximum stresses determined at Quad-Cities are similar to those shown on the Dresden Docket, Amendments 20 and 21. Twice the design values were reviewed to assure criteria compliance.

Class I piping that is under 10 inches in diameter is analyzed by the force-deflection curve method. This method is identical to that described in the previously referenced Dresden AEC amendments. In summary, this method utilizes a set of curves to place horizontal restraints in a manner which limits stresses to acceptable values. The piping section period is checked to ascertain if the system is rigid, resonant, or flexible in relation to the building. The resonant range (piping period 0.08 to 0.23 second by definition) is avoided in selection of spans. A factor of 3 is applied to deflections and reactions if the piping is flexible and the pipe is more than 25 feet above the foundation in order to account for building amplification. Valves and branch connections are considered by limiting spans to the rigid category and then reducing the allowable spans by a factor of two, and 33% of the additional weights are added to reactions to account for this increased loading. Deflections and loadings determined for the family of curves are based on the ground acceleration spectra with 0.5% damping. A significant feature of the curves is that deflections are limited to values that will exceed 2 inches or will not result in stresses greater than 3700 psi. The results are reviewed to ensure that double these loadings, combined with the normal operating loads, will not result in a stress greater than yield of the piping material. The technique is used on the multitude of Class I, 8-inch and smaller lines such as the instrument lines.

2.6 The pipe support loads and analysis methods appear consistent with those accepted by NRC for interim operation at other plants. To ensure proper implementation, some examples to illustrate the method, including how the worst case failure mode of a support would be incorporated into the analysis, should be provided. (Section 4.0)

Response:

The criteria has been revised to state the following:

"Should the support stresses not meet their operability limits, then additional iterative analyses of the piping may be required. The iterative analyses may use the knowledge that a support is not capable of withstanding the loads, and can be removed from the analysis. Where feasible, the actual support stiffness may be included in the iterative analyses."

Example:

An operability analysis is performed on a system containing three supports (A, B, and C) and it is discovered that support A is not capable of withstanding the loads. The first analysis assumes support A is active and results in loads on supports B and C of 100 lbs. and 200 lbs., respectively. The second analysis assumes support A is inactive and results in loads on supports B and C of 80 lbs. and 400 lbs., respectively. The envelope loads for supports B and C of 100 lbs. and 400 lbs., respectively would be used to determine the stresses in supports B and C.

2.7 For standard supports with manufacturer's load rating, the criteria are similar to those accepted by NRC for interim operation at other plants. However, the technical basis for the safety factors on ultimate test loads and for the multiplier of 1.67 S_u/S_y on Level A allowables is unknown and should be provided. If based on ASME Code, the applicable Code edition and subsection should be referenced. (Section 4.1.1)

Response:

The factor of safety of 2 is from IEB 79-02 [4]. For u-bolts, a more conservative factor of safety of 3 is used since test results indicate u-bolt lateral deflections increase quickly at loadings greater than about half of the ultimate load.

The 1.167 S_u/S_y factor on Level A loads is from Regulatory Guide 1.124 [5]. Actually, the criteria is more restrictive since Regulatory Guide 1.124 allows the factor to be 1.4 if $S_u \leq 1.2\ S_y$. However, to ensure consistency between Regulatory Guide 1.124 and the criteria, the Regulatory Guide 1.124 criteria will be incorporated in its entirety as follows:

".... the smaller factor of 2 or 1.167 S_u/S_y, if $S_u > 1.2S_y$ or 1.4 if $S_u \leq 1.2S_y$."

A reference to IEB 79-02 and Regulatory Guide 1.124 will be added to the criteria.

2.8 The structural steel stress limits are very similar to those accepted by NRC at other plants. However, the proposed use of actual yield strengths based on certified material test reports (CMTRs) is generally not acceptable. Their use would further reduce safety factors to levels which may be unacceptable for even interim operation. The use of Code minimum yield strengths is appropriate. (Section 4.2.1)

Response:

The criteria will be revised to only allow the use of code values for S_u and S_Y.

2.9 The snubber load limits are consistent with other NRC accepted interim criteria. However, the snubber criteria should also include a requirement that calculated movements do not exceed the travel range. (Section 4.3.2)

Response:

The following statement will be added:

"Snubbers shall also be reviewed to ensure they can accommodate thermal movements without exceeding travel limits."

Section 3.0

REFERENCES

3.0 REFERENCES

[1] NRC Letter from Byron Siegel/Leonard N. Olshan to Thomas J. Kovach (CECo), dated January 11, 1991.

[2] Quad Cities UFSAR, Section 12.2.2.7.

[3] Impell Record of Conversation to the NRC from CECo and Impell, dated May 13, 1986, Impell Job No. 0590-144.

[4] IE Bulletin No. 79-02, Revision No. 1, (Supplement No. 1), dated August 20, 1979.

[5] Regulatory Guide 1.124, "Service Limits and Loading Combinations for Class 1 Linear-Type Component Supports," Revision 1, January 1978.

[6] Commonwealth Edison Company letter from Robert F. Janecek to James G. Keppler (NRC) "Dresden Station Units 2 and 3, Quad Cities Station Units 1 and 2, Additional Responses Concerning IE Bulletin 79-14", dated January 5, 1981.

[7] NUREG/CR-0891, "Seismic Review of Dresden Nuclear Power Station - Unit 2 for the Systematic Evaluation Program."

[8] Quad Cities FSAR, Section 12.2.7.

Section 4.0

DRAFT LICENSING SUBMITTAL