

TERA

DMB

May 16, 1984

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RA	10	DPRP	
D/RA		DE	
A/RA		DRMSP	
RC		DRMA	
PAO		SCS	11/10 +3 ✓
SGA		ML	2/11
ENF		File	✓

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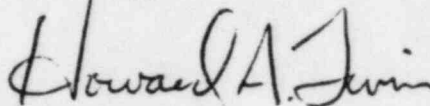
Subject: TERA Comments on Bechtel Response
to Confirmed Items C-144

Dear Lou:

TERA has reviewed Bechtel's April 27, 1984 letter (No. 149292) which contains an outline of their proposed response to Confirmed Item C-144. Our comments, which define our additional information needs, are attached.

Should you require any clarification of our discussion, please contact Mr. Doug Witt at our Berkeley office. Information pertaining to the disposition of this item may either be discussed at our next review meeting in mid-June or via correspondence.

Sincerely,



Howard A. Levin
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Attachment

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TERA COMMENTS ON DRAFT OUTLINE
FOR BECHTEL RESPONSE TO OCR ITEM C-144

General Comments

The draft outline includes specific items which collectively cover all of the concerns raised in the OCR, and generic information regarding aspects of the approach to piping analysis which in general result in conservative design. The latter should be useful as background to place the OCR issues in perspective; however, our review of your response to the OCR will place heavy emphasis on information which is specific to the Midland project. Such information can be of two types:

1. Evidence that the specific technical concerns are not significant in magnitude for the piping and pipe supports in the Midland plant (i.e., the design of Midland is such that inclusion of the factors noted in the OCR would produce insignificant changes in the design of piping and supports).
2. Information which supports the position that margins due to design measures specific to the Midland plant (i.e., margins in addition to those inherent in "standard" industry methods) offset the effects of the OCR concerns.

It is recognized that rigorous mathematical proof of the above is not practical and might necessitate unwarranted analysis. In lieu of this, a careful examination of a sample of Midland's piping may provide the justification we require to disposition the OCR. A key requirement for establishing the validity of conclusions reached from such an approach is the validity of the sample. Statistical proof is not necessary, but the representativeness of the sample for the specific concern must be demonstrated. It is also expected that the stresses, loads, displacements, etc., will be affected to some extent by any alteration in analytical method. The issue is whether such differences are significant. Guidance for assessing significance is provided in Standard Review Plan Section 3.7.

In general, the draft outline does not include sufficient detail to allow us to determine if the Bechtel response to OCR-C-144 will provide the type of information discussed above and enable us to disposition the OCR. Specific comments are provided below to facilitate the preparation on your response.

Specific Comments

- IIA Revision 0 of Regulatory Guide 1.92 was implemented in the NRC licensing review of plants that filed operating license applications after April 1, 1975. Not all plants complied with all the regulatory positions in the Guide; however, the position regarding closely spaced modes has been adopted by a portion of the industry.

During the May 3, 1984 OCR meeting, FSAR Appendix 3D was discussed as documentation of the studies performed by Bechtel addressing the Regulatory Guide 1.92 issue. We had previously reviewed Appendix 3D, and more information is required to disposition this aspect of the OCR.

The detailed basis for sample selection needs to be presented. For example, the results show that pipe support and nozzle loads increase by more than 10%. This increase was then determined to be acceptable, because design margin was available in the existing design. How was existing design margin considered in selecting the analysis problems; that is, was the sample biased so that it contained problems where the margin was low? For the nozzle load assessment, we need to know not only the applied loads, but also the allowable loads and how these were determined. This type of information needs to be added to that presented in Appendix 3D.

A second issue is the concern that the margins which were available at the time of the study may be diminished as construction proceeds. TERA would need to see a discussion of the measures which will be taken to prevent a decrease in design margin as construction change requests are evaluated in the future. Any revision to a piping analysis has the potential for increasing support or nozzle loads. If these increase sufficiently, the

argument used in the FSAR for neglecting the effects of closely-spaced modes is no longer valid, because the justification is dependent on the margin between existing capacity and loads calculated.

- IIB It was at one time an accepted industry practice to cut off dynamic analysis at 33 Hz. Various approaches have more recently been employed to account for the higher frequency participation. The approach used on Midland is more conservative than using a 33 Hz cutoff to the dynamic analysis; however, it will always neglect some portion of the response. The question is whether that portion neglected is ever of practical significance.

We concur with point 1 of the Bechtel outline, and also recognize the shortcomings of results of calculated response at high frequencies as mentioned in point 2. Residual response can, however, be approximated in an acceptable manner using computer programs that calculate the effective mass not included in the dynamic response at lower frequencies, and then use equivalent static methods for that mass. This method has been applied to certain plants including, for example, the SMA Seismic Margins Evaluation of Midland. The Bechtel program ME101 appears to have this same capability based on our review of the users' manual. This would provide a basis for comparing such results with the present Bechtel method. As in the item IIA discussion, sampling technique is critical to the validity of the conclusions.

- IIC Industry practice has changed in the last ten years regarding support stiffness. It may not be practical to reanalyze piping to confirm that the effects of support stiffness are sufficiently small to neglect. As an alternative, industry design practice for pipe supports frequently included methods which essentially bounded the stiffness in a manner which mitigated the impact of this issue. One approach to responding to this concern is to demonstrate that measures were taken to ensure that engineering consideration of support stiffness was taken or will be taken during as-built confirmation.

The offsetting effect of thermal and seismic loads only applies to higher temperature piping. Adequate consideration needs to be given to low temperature piping where seismic support loads may dominate.

- IIIC The Seismic Margins Evaluation provided by SMA for the seismic margin earthquake shows that many of the supports sampled were very conservatively designed. Credit for such conservatism can be taken to offset the OCR concerns, provided it can be demonstrated that it was a result of a controlled design process. There needs to be assurance that the conservative methodology was universally applied and that it will continue in the design revision process, if the conservatism is used to offset uncertainties arising from the piping analysis methods addressed in the OCR. Sampling can be used to demonstrate past conservatism inherent in the design process; however, without evidence of specific controls which led to the conservatism, the sample would have to be large and statistically random.