

DISTRIBUTION:
~~Docket File~~
DE:MEB Reading File

MAR 17 1981

Docket No.: 50-329/330

MEMORANDUM FOR: Robert L. Tedesco, Assistant Director for Licensing, DL

FROM: James P. Knight, Assistant Director for Components & Structures, DE

SUBJECT: RESPONSES TO CONSUMERS' POWER FIRST SET OF INTERROGATORIES FROM THE MECHANICAL ENGINEERING BRANCH (MIDLAND SETTLEMENT ISSUE)



Find enclosed input from the MEB responding to the first set of interrogatories issued by Consumers Power concerning soil settlement dated November 17, 1980. These responses are primarily concerned with buried piping and were prepared by A. J. Cappucci with technical assistance from ETEC. Drafts of these responses were provided to Dave Hood of your staff to assist him in meeting the deadlines set by the ASLB.

James P. Knight, Assistant Director for Components & Structures
Division of Engineering

Enclosure: As stated

cc w/o encl: R. Vollmer
W. Patton

cc w/encl: R. Bosnak
H. Brammer
F. Cherny
D. Hood
H. Levin
L. Auge, ETEC
F. Rinaldi
J. Kane
R. Gonzales
D. Gupta

810 3260320

XA

12
14

OFFICE	DE:MEB	DE:MEB	DE:MEB	AB/C&SE		
NAME	ACappucci:lb	HBrammer	RBosnak	JKnight		
DATE	3/6/81	3/11/81	3/17/81	3/17/81		

Responses to Consumers'
First Set of Interrogatories

Not applicable.

The 50.54(f) questions 17 thru 20 were directed to acceptance criteria. The portions of these questions so directed are:

- (a) 50.54(f) question 17 - A portion of this question concerning the assurance of code allowable conditions and proper remedial action.
- (b) 50.54(f) question 18 - All of this question related to acceptance criteria.
- (c) 50.54(f) question 19 - A portion of this question requires defining acceptance criteria for excessive deformations.
- (d) 50.54(f) question 20 - All of this question related to acceptance criteria.

The acceptance criteria coupled with the details of the remedial action is necessary to evaluate the technical adequacy and proper implementation of the proposed action. The acceptance criteria from ASME Section III, AWWA or some other defined acceptance criteria is required to determine whether or not the piping in question will perform its intended function. That is to maintain its pressure boundary integrity and allow unrestricted design flow. If the piping does not meet its defined acceptance criteria, then remedial action must take place, this could mean further analysis or repair such as rebedding the piping. The staff must have confidence that the remedial action will either demonstrate that the piping can perform its intended function or return the piping to a physical state where its performance is assured. Therefore, the staff must evaluate the proposed actions.

In the responses to the 50.54(f) questions (17 thru 19) acceptance criteria and the basis for this criteria was either non-existent or weakly presented. Specifically:

- (a) There was no commitment to use the 3.0S_u limit of NC-3652.3 of ASME Section III, Division 1. However, in table 17-2 of the responses to the 50.54(f) questions there is an indication that the code calculations were used.
- (b) In terms of seismic category I piping between structures references are made to applicable codes, however, there was no indication as to which codes or what specific acceptance criteria the piping would meet.
- (c) There was no basis for selection criteria for determining which piping would be profiled.

Up and until December 6, 1979, each item the staff requested with regard to acceptance criteria with reference to seismic category I piping is listed below.

- (a) In 50.54(f) question 17 the staff requested acceptance criteria for meeting code allowables.

- (b) Again, in 50.54(f) question 18 the staff requested acceptance criteria concerning compliance with the code allowables.
- (c) In 50.54(f) question 19 acceptance criteria was requested defining excessive deformation.
- (d) In 50.54(f) question 20 acceptance criteria was required to define acceptable loads on components and supports produced by pipe deformations due to settlement.

6. -5a(a) 50.54(f) question 17

- (b) yes
- (c) response to 50.54(f) question 17, revision 2, 7/79
- (d) no
- (e) 1/
- (f) There was not commitment to use 3.0S criteria of the ASME Code, only an indication that it was compared with the actual stresses due to settlement for illustrative purposes.
- (g) R. Stephens/A. Cappucci ⇒ MEB/NRR

-5b(a) 50.54(f) question 18

- (b) yes
- (c) responses to 50.54(f) questions 18, revision 2, 7/79
- (d) no
- (e) 1/
- (f) There was no detailed description of the acceptance criteria; provided only that they would comply with the applicable codes. More details as to the stress limits used would be required.
- (g) R. Stephens/A. Cappucci ⇒ MEB/NRR

-5c(a) 50.54(f) question 19

- (b) yes
- (c) response to 50.54(f) question 19, revision 2, 7/79
- (d) not determined prior to 12-6-79
- (f) The adequacy of the acceptance criteria for determining the acceptable deformation limits was under review pending the results of the surcharge program.
- (g) R. Stephens/A. Cappucci ⇒ MEB/NRR

-5d(a) 50.54(f) question 20

- (b) yes
- (c) responses to 50.54(f) question 20, revision 2, 7/79
- (d) no
- (e) 1/
- (f) No acceptance criteria was defined, only a statement that there was an indication that the loads on components were within the allowables.
- (g) R. Stephens/A. Cappucci ⇒ MEB/NRR

7. Each item of acceptance criteria the staff requested after December 6, 1979 is listed below. This information was requested by ETEC and subsequently transmitted by the staff after review.

- (a) The criteria which addresses pipe buckling.
- (b) The criteria for the selection of piping to be profiled.
- (c) The criteria for the change in piping curvature.

8. 7a(a) Document given at a meeting between Consumers' Power and NRC on January 16, 1980
- (b) yes
 - (c) in response to questions 17 & 34, revision 5
 - (d) no
 - (e) conference call on 9/8/80
 - (f) The criteria does not consider the local buckling or crippling stresses due to high bending stresses in the large diameter thin walled piping.
The buckling stresses due to earth loads, vehicular and railroad traffic, etc. are based on uniform soil properties. From the pipe profiles it is apparent that this is not the case.
 - (g) A. Cappucci, MEB/J. Brammer, ETEC

- 7b(a) see 7a(a) above
- (b) yes
 - (c) response to 50.54(f) question 17, revision 5
 - (d) no
 - (e) conference call on 9/8/80
 - (f) There was not sufficient information as to the total piping involved, the proximity of the non-profiled to the profiled piping, the percentage of piping profiled, soil characteristics in the area of concern, etc. Due to changes in slope of some of the profiled piping, it would then appear that the soil characteristics vary.
 - (g) A. Cappucci, MEB/J. Brammer, ETEC

- 7c(a) see 7a(a) above
- (b) no
 - (c) none
 - (d) not applicable
 - (e) not applicable
 - (f) The rate of change on the slope or the radius of curvature of the piping determines the bending stress more than the overall deflection. This request was made on that basis. If a satisfactory allowable stress and strain criteria is presented with an acceptable stress analysis, the criteria for the change in piping curvature would not be required.
 - (g) A. Cappucci, MEB/J. Brammer, ETEC

It should also be noted that ETEC had concerns about the small piping associated with the Diesel Generators. The diesel fuel lines in particular. ETEC requested acceptance criteria for compliance with the Code for these lines. A. J. Cappucci determined that Consumer's original discussion of these lines was acceptable.

9. (a) That all the Seismic Category I piping be profiled.
- (b) That remedial action be specified if stresses due to settlement approached or were beyond the code allowables.
 - (c) That details as to the calculational schemes and assumptions for determining stresses due to settlement and other combined loads be submitted and reviewed.
 - (d) That the results of the analysis of nozzle loads be submitted.
 - (e) That a monitoring program be established over the life time of the plant to monitor future settlements.
 - (f) That future settlements be included in the presented analysis.

10. 9a(a) yes
(b) 50.54(f) question 17
(c) response to 50.54(f) question 17, revision 2
(d) no
(e) unknown
(f) The criteria for selection of the piping to be profiled appears to be based on the soil in the same proximity as being homogeneous. There is no evidence that this is the case.
(g) R. Stephens/A. Cappucci ⇒ MEB/NRR
- 9b(a) yes
(b) 50.54(f) question 17
(c) response to 50.54(f) question 17, revision 2
(d) no
(e) unknown
(f) The response to 50.54(f) question 17 stated that the stresses due to settlement would be well below the code allowables as indicated in table 17-2. Therefore, it was indicated that remedial action was not planned. This was not responsive because (1) all piping was not profiled (2) future settlements had not been predicted and (3) the results of the surcharge program had not been established.
(g) R. Stephens/A. Cappucci ⇒ MEB/NRR
- 9c(a) no
(b), (c), (d) and (f) - not applicable
(g) R. Stephens/A. Cappucci ⇒ MEB/NRR
- 9d(a) no
(b), (c), (d) and (f) - not applicable
(g) R. Stephens/A. Cappucci ⇒ MEB/NRR
- 9e(a) yes
(b) 50.54(f) question 18
(c) response to 50.54(f) question 18, revision 2
(d) no
(e) unknown
(f) The response to the above question (9e(c)) indicated no plans for a monitoring program if the settlements remain within the predicted range. I was not clear as to the time frame and methods for verifying the predicted ranges.
(g) R. Stephens/A. Cappucci ⇒ MEB/NRR
- 9f(a) yes
(b) 50.54(f) questions 17, 18 and 19
(c) responses to 50.54(f) questions 17, 18 and 19, revision 2
(d) no
(e) unknown
(f) response to 50.54(f) 17 - no information as to the settlements over the lifetime of the plant/response to 50.54(f) 18 - adequate/response to 50.54(f) 19 - no information as to the predicted deformations
11. The following is a list of information the staff will require to conclude that the safety issues associated with remedial action to be taken to correct soil deficiencies with regard to underground piping will be resolved. This list does not include responses to interrogatory 7.

- (a) A final stress analysis of the Seismic Category I piping.
- (b) An explanation for the relatively rapid changes in some of the piping profiles and the magnitude of the loads which cause these changes.
- (c) The actual and predicted clearances after 40 years of Seismic Category I piping at building penetrations.
- (d) The loads and stresses on the piping at their termination points (anchors, equipment, larger pipe, etc.).
- (e) From the January 20, 1981 meeting provide method and basis for normalizing the profile data prior to performing the stress analysis and used of 3" inch future settlement data. If a non-linear analysis is to be performed provide the analysis methodology with a summary of the results. Include a presentation of the margin to the Code allowable for settlement only and the same for the margin to failure considering all primary and secondary stresses.

12. 11a(a) yes
- (b) letter from Robert L. Tedesco to Mr. J. W. Cook dated October 20, 1980.
 - (c) letter from J. W. Cook to R. L. Tedesco dated November 14, 1980 including a document entitled, "Summary of Settlement Stress Calculations for Buried Piping".
 - (d) no
 - (e) conference call on January 14, 1981
 - (f) The Bechtel Stress Analysis appeared to be unconservative and did not give a true representation of the actual stresses in the piping. There were questions as to which profiles were used and the justification for the boundary conditions assumed. An ETEC stress analysis demonstrated much higher stresses than the Bechtel report. It should also be noted that at the January 20, 1981 meeting Bechtel stated that subsequent analysis had shown much higher stresses for certain lines.
 - (g) A. Cappucci, MEB/J. Brammer, ETEC

- 11b,c&d(a) yes
- (b) meeting of January 20, 1981
 - (c) } Consumers' has not responded to
 - (d) } these requests
 - (e) }
 - (f) }
 - (g) A. Cappucci, MEB/J. Brammer, ETEC

- 11e(a) No. After the January 20, 1981 meeting a preliminary response to Consumers' presentation and questions was drafted and sent to the Project Manager (D. Hood).
- (b), (c), (d), (e), (f) - Not applicable.
 - (g) A. Cappucci, MEB/ J. Brammer, ETEC

- 13) Consumers' Power Company has submitted the following acceptance criteria concerning the stresses and deflection of the buried piping due to ground settlement.
- 1) The stresses will meet the ASME Section III, Division I, Subsection NC, Equation 10a Code requirement (3Sc).

2) AWWA criteria concerning the allowable radial deflections of buried piping.

14. Consumers' has submitted sufficient information on the criteria identified in the response to interrogatory 13 to justify each acceptance criteria if in fact they meet it.
15. Other than the criteria listed in reponse to interrogatory 13, neither ETEC or the MEB has knowledge of any other criteria which Consumers' has supplied concerning buried piping.
16. See the response to interrogatory 15.
17. Not applicable.