

MEETING MINUTE

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Jan. 11, 1980

REGULATORY DOCKET FILE COPY

MEMORANDUM FOR: V. S. Noonan, Chief, Engineering Branch
Division of Operating Reactors

FROM: A. Lee, Engineering Branch
Division of Operating Reactors

SUBJECT: SUMMARY OF MEETING HELD ON DECEMBER 27, 1979
TO DISCUSS NUPIPE PROGRAM

The meeting was held in Bethesda with VEPCO and their consultants (Stone & Webster and Ebasco) as well as Quadrex, the originator of NUPIPE to discuss the use of ELASTOJT element in NUPIPE and its potential effects on the pipe stress calculation.

A list of attendees is attached.

Quadrex had introduced in NUPIPE the concept of "Reaching" in which local moments attributed to an elbow are taken from the adjacent (straight) element when an absolute summation of individual load cases is made. This latest NUPIPE scenario began when Ebasco notified Quadrex that in their Surry 2 pipe reanalyses local elbow moments for absolute summation of individual load cases do not match the hand calculated sum. Quadrex noted to Ebasco that the only instance in which this would be incorrect is when the torsional moment axis of the elbow is not aligned to the local x-axis of the adjacent element. Review of the Fortran coding also showed that there is no check to see if the adjacent element is an ELASTOJT (boundary condition element), which is the only case in NUPIPE for which the user may legitimately misalign axes.

Based on the above, Quadrex presented the following conditions for error when elbow/ELASTOJT connection is used in NUPIPE analysis:

1. Analyses are in accordance with B31.1-1967. Because it is the only "Code" option available in NUPIPE that uses local moments to calculate stresses.
2. An elbow/ELASTOJT connection with misaligned local x-axis must exist. Because it is the only case where the elbow stress can be computed by selecting the wrong moment component for torsion.
3. An absolute sum of two load cases is being formed. Because that is the only combination where "REACHING" is necessary to get a continuous stress calculation.

In the case of Part 21 notification, no hardware example of the defective feature was shown to Quadrex. Specifically, Quadrex's review of one pipe analysis performed for Stone & Webster, B.E.L. 8818, on behalf of VEPCO indicated that although B31.1-1967 has been used no adverse conditions are indicated.

In the investigation by Stone & Webster, for the five shutdown plants (includes 18 Surry 2 problems) and North Anna Units 1&2, two cases have been identified where elbow/ELASTOJT connection was used (one involves expansion joint). However, no appreciable difference in stress was found, because in both cases, the x-axes are aligned.

Stone & Webster further stated that for nozzle analyses, 6 x 6 diagonal stiffness matrix representing anchor/restraint was directly input to the program thus by-passing the elbow/ELASTOJT option.

Among 55 Surry 2 problems analyzed by Ebasco, 17 points were identified to have used elbow/ELASTOJT connection and to have been identified with the adverse conditions of error. It was found that 14 of the 17 points have discrepancies within 2 1/2 percent, two points are between 2 1/2 and 4 1/2 percent (on the conservative side) and finally, one point has 7 1/2 percent discrepancy on the unconservative side and hence the corresponding hand calculated result was used.

In conclusion, NRC requested the following in order to satisfy the requirement of the Part 21 reporting:

1. Quadrex is to provide NRC with the list of 31 CYBERNET NUPIPE customers whom, in turn, will also be notified by Quadrex for the proposed fix by mid January.
2. Stone & Webster is to provide NRC with the result of the complete review of pipe analyses using NUPIPE.



A. Lee, Section C
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Attachment:
List of Attendees

cc: w/Attachment

LIST OF ATTENDEES
AT DECEMBER 27, 1979 MEETING

NRG

K. R. Wichman
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A. Lee
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Local PDR

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NRR Reading

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D. Eisenhut

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