



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Woodruff

MAR 13 1981

MEMORANDUM FOR: E. L. Jordan, Acting Chief, Reactor Engineering Branch, IE
FROM: R. W. Woodruff, Acting Chief, Mechanical, Structural and Metallurgical Branch, REB, IE
SUBJECT: EVALUATION OF A PROPOSAL BY CIE

Proposal

In an unsolicited proposal from Computerized Interference Elimination, Inc. (CIE), their capability to identify interferences in piping systems was described. CIE reviews design drawings and inputs into computer memory a mathematical description of the boundaries of the space being examined and the configurations of the systems and structures contained in the space. The computer then identifies any portions of systems or structures that occupy the same volume as indicated by the drawings.

CIE's proposal states that the interference analysis would be applied on a demonstration basis to 50,000 to 75,000 cubic feet of space in the containment or auxiliary building of any single nuclear unit designated by IE. CIE would require that IE furnish reproducible drawings which clearly depict system sizes and locations and the necessary dimensions in three coordinates. Where dimensions are not included on the drawings, CIE would obtain the information by scaling to the best of their ability. After performing the analysis, CIE would provide a dimensioned sketch of each interference found.

In their proposal, CIE states that they are not a qualified engineering firm and that they assume no responsibility for engineering decisions or evaluations.

Background

Because of the complexity of nuclear power plants, piping interferences in safety-related systems do result from the design process even though designers take precautions to avoid such interferences. Interferences become obvious during construction and piping is rerouted or offending components are modified. Where piping is rerouted, design drawings are revised to show the as-built configuration and an engineering evaluation is performed to assure that rerouted piping has adequate strength.

As a result of inspections by IE and by some licensees, several piping non-conformances were discovered in late 1978 and early 1979 which potentially affected the validity of seismic analyses for some operating nuclear units. IE subsequently issued Bulletin 79-14 in July, 1979. This bulletin required

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licensees to verify the as-built configuration of their safety-related piping systems and to compare the verified piping configuration to the configuration assumed in the seismic analyses for these systems. Where significant differences were found, licensees were required to redo those analyses and to modify the systems, if necessary, to meet design criteria. This effort is essentially complete for operating plants.

In discussions with IE, CIE has advanced the notion that application of an interference analysis to a selected space at an operating reactor would be helpful in determining the adequacy of the licensee's response to Bulletin 79-14.

Evaluation

There are three methods for identifying interferences in piping systems during the design process. These are:

1. physical modeling,
2. mathematical modeling, i.e., the method used by CIE, and
3. cross checking of drawings.

Mathematical modeling, using a qualified computer program, can be as effective for this purpose as physical modeling and more effective than cross checking of drawings.

For an operating unit that has accurate as-built drawings, application of methods (1), (2) and (3) cannot possibly identify real interferences if these drawings are used for the analysis. Use of original design drawings for this purpose would not have merit since neither the as-built system nor the seismic analysis would conform in all respects to those drawings.

Because Bulletin 79-14 required detailed inspection of safety-related systems and revision of drawings to reflect the as-built configuration, because of reports of deficiencies submitted by licensees, and because of IE's inspection of this effort, it is apparent that the accuracy of as-built drawings for safety-related systems has been significantly improved.

CIE's proposal covers 50,000 to 75,000 cubic feet of space at a single operating unit. Assuming 1 to 2 million cubic feet for the space occupied by safety-related systems at a single unit and 70 operating units, the sample size is less than 0.1%. The likelihood of finding an as-built drawing deficiency after compliance with Bulletin 79-14 is small and would pose an undue burden for the licensee selected for this demonstration.

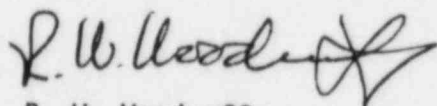
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Conclusion

Mathematical modeling can be effective in identifying piping interferences during design but does not have merit when applied to drawings that have been revised during a careful inspection of installed systems.

Recommendation

CIE's proposal should be rejected.



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cc: J. H. Sniezek, IE