PUBLIC
SERVICE
INDIANA

October 7, 1982

Mr. Mark Williams
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Williams:

In response to Mr. D.G. Eisenhut's "Call for Papers (SMiRT-7)", please find attached an abstract and a summary cover sheet for a paper entitled, Testing of 1/4"Ø Expansion Anchors in Repaired Concrete.

Via this letter, I respectfully request that your committee review the abstract for consideration as a candidate for the paper being presented at SMiRT-7 in August, 1983.

Please call me at (812) 289-1000, extension 1747, should you have any questions.

Sincerely,

C.S. Togni

C.S. TOGNI
Chief Civil Engineer

CST/jj
Attachment

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P.O. Box 190, New Washington, Indiana 47162 812 .. 289 . 1000

ABSTRACT

TITLE: Testing of 1/4"Ø Expansion Anchors in Repaired Concrete

Concrete repairs for surface defects are generally performed with materials having the compressive strength of concrete, but lacking the coarse aggregate. Short 1/4"Ø concrete expansion anchors may occur in these repair areas, but the authors are not aware of any data which exists for anchors installed in material lacking a coarse aggregate. In order to assess the adequacy of these short anchors, Public Service Indiana tested 1/4"Ø expansion anchors in actual concrete patches. Successful testing would enable PSI to anchor items such as lighting and instrumentation in an economical manner.

A total of thirty-two (32) test anchors were installed in various concrete patches in the Auxiliary Building. A variety of patches were used to sample both workmanship and different embedment materials. All repair materials have a minimum compressive strength of 5500 psi. Anchors from two manufacturers were tested. Two embedment lengths, 1 1/8" and 2 1/2", were used. Installation and testing was in accordance with ASTM E488-76.

Testing revealed differences in anchor performance between different embedment media. All 2 1/2" embedment anchors installed in a proprietary grout demonstrated a deflection of approximately 1/2" at relatively low loads. After this slippage, the load on the anchor increased to failure. All failures were by anchor slippage. Anchors of the same length, installed in gunite patches, generally showed a uniform increase in load and deflection up to failure. The majority of the failures for anchors in gunite were by tensile failure of the anchor. Anchors installed with an embedded length of 1 1/8" had virtually identical behavior in both materials. All failures for these anchors were in the shear cone mode.

Comparsion of test results and manufacturers published data demonstrate performance of anchors in patch material superior to anchors installed in 3000-4000 psi concrete. Ultimate failure loads for comparable anchors installed in different materials were very similar, but deflection of 2 1/2" embedded length anchors in the proprietary grout was more than twice the deflection for the same anchor in gunite. All anchors tested had ultimate strengths in excess of the design requirement, including the load at which the 1/2" slip was observed in the anchors in the proprietary grout.

7th International Conference on
STRUCTURAL MECHANICS IN REACTOR TECHNOLOGY

SUMMARY COVER SHEET *

FIVE COPIES REQUIRED

see footnote

TITLE (no longer than 16 words): Testing of 1/4"Ø Expansion Anchors in Repaired Concrete

AUTHOR(S) and AFFILIATION(S): (List of authors in the order they are to appear and exactly as they are to be published. List each author's affiliation and correct mailing address):

1) Carl S. Togni - Public Service Indiana, P.O. Box 190, New Washington, Indiana, 47162

2) Alan F. Varney - Public Service Indiana, P.O. Box 190, New Washington, Indiana, 47162

3) Charles M. Coones - Public Service Indiana, P.O. Box 190, New Washington, Indiana, 47162

4) A possible 4th author to be named later.

Circle number of author to whom correspondence should be addressed.

In which topical division of the conference (see list below) would this summary belong, in your opinion?
Division D

Division B.	Thermal and Fluid/Structure Dynamics Analysis	Division H.	Structural Engineering of Prestressed Reactor Pressure Vessels and Other Structures
Division C.	Structural Analysis of Fuel, Cladding and Assemblies	Division J.	Loading Conditions and Structural Analysis of Reactor Containment
Division D.	Operating Reactor Structural Experience	Division K.	Seismic Response Analysis of Nuclear Power Plant Systems
Division E.	Structural Analysis of Fast Reactor Core and Coolant Circuit Structures	Division L.	Materials Modelling and Inelastic Behavior of Materials and Structures
Division F.	LWR Pressure Components — Core Structures and Piping	Division M.	Reliability and Risk Analysis of Nuclear Power Plants
Division G.	LWR Pressure Components — Vessels	Division N.	Mechanical and Thermal Problems of Future Reactor Fusion Reactor Power Plants

Word count: Text ..... + (1 equation × 40 .....)

Total .....

This total has to be between 400 and 500 words.

Have you presented related papers? If so, where and when? No

Has the paper been submitted for publication in a technical journal, and if so, to which one a. ' when? No

* A COMPLETED SUMMARY COVER SHEET, MUST BE ATTACHED TO EACH OF THE 5 COPIES OF THE SUMMARY