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NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

July 6, 1979

Mr James G Keppler
Director - Region III
Office of Inspection and Enforcement
United States Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr Keppler:

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Response to NRC IE Bulletin No. 79-02

Since the receipt of NRC IE Bulletin No. 79-02, Prairie Island Nuclear Generating Plant, Units 1 and 2, has made a continuous effort to comply.

This effort began with our becoming a member of the Generic Program being conducted at Teledyne Engineering Services (TES) in Waltham, Massachusetts. The Generic Program at TES consists of basically two tasks; analytical and experimental. The analytical task is the development of a pre and post processor for the ANSYS computer program for the analysis of baseplates. This program has been verified analytically and experimentally and is presently being used for baseplate analysis in our Plant Specific Program, also being performed by TES.

The experimental task in the Generic Program will specifically address item 4a of the bulletin. A test matrix is presently being set up to perform shear-tension interaction tests and low/high cycle fatigue tests. It is our understanding that this test data from the Generic Program will be available on July 15, 1979 and a report issued on July 23, 1979.

Our Plant Specific Program began by reviewing all Seismic Category I pipe supports and separating out those that use concrete expansion anchor bolts. It was found that all expansion anchor bolts used in both Unit 1 and 2 are the shell type.

Next, all applicable drawings were reviewed and categorized by our analysts using simple conservative strength of materials techniques with a criteria of Pu/10 for bolt design load. Any expansion anchor bolts which exceeded this criteria were flagged for more detailed analysis. Also during this categorizing if any anchor bolts were determined to have a factor of safety less than 5 an immediate redesign was implemented and the modification initiated at the site. Some 1.25% of the total number of baseplates (15 of 1199) total from both Units 1 and 2 fell into this less than a safety factor of 5 category.

Proceeding concurrently with the analysis was the field verification phase of the program. This phase involved randomly inspecting pipe supports used in each of the Seismic Category I systems. Measurements were made to verify that the support in the plant was the support described on the as built drawings. Parameters such as baseplate dimensions and the dimensions of the attached structure were obtained using conventional tape measures, etc. Baseplate thickness and bolt overall length were obtained using ultrasonic thickness meters. Bolt size and thread engagement were calculated from obtained dimensions. All supports found to vary from the drawings were immediately evaluated using the Pu/10 criteria and if found deficient were immediately flagged for analysis and/or redesign.

At this writing, the field verification phase of the program has verified a total of 227 baseplates, randomly selected among the Seismic Category I systems, some 19% of the total applicable supports. Approximately 15% of the verified supports had variations and of these approximately 1% required immediate redesign and repair. Types of variations were short thread engagement based on a 1 X the bolt diameter (ID) as a minimum, center to center bolt spacing, and baseplate thickness varying by more than one size. Supports inside containment will be verified during the next outage for both Units 1 and 2, March and January, 1980, respectively.

The next phase of the program in response to Bulletin No. 79-02 is the field testing of a representable sample of the bolt population to a bolt tension load of Pu/5 (bolt ultimate capacity divided by a factor of safety of 5). At this writing a total of 352 anchor bolts used in 169 baseplates have been direct pull tested (tensile test). There was no shell/joint slippage during any of the tests. The choice of which shell to pull was random throughout the plant, but care was taken to select from each system. Both clean areas and contaminated areas were covered. Supports that use concrete expansion anchor bolts inside containment will be randomly pull tested during the next refueling outage.

During the tensile testing everything possible was done to gather accurate results including removal of some restraints to ensure that the baseplate was not touching the top of the shell. Also all equipment used had the necessary calibration to provide the proper accuracy.

Based on this investigation we plan to continue verification of our baseplates that use concrete expansion anchors.

Concurrent with this verification we will complete the stress analysis of those baseplates categorized as flexible using the Pu/10 criteria. Some 320 baseplates require detail analysis. Of this total, 20% have been completed and these results show at least a factor of safety of 5 on design load versus bolt ultimate capacity.

The schedule for completion of the above work is 16 to 18 weeks for those outside containment.

We believe that an adequate level of confidence in Prairie Island expansion-type anchorage installation has been established, and we have therefore terminated the tensile-testing phase of the program.

Very truly yours,

L. J. Wachter

L J Wachter
Vice President - Power Production
and System Operation

LJW/ak

cc: Mr G Charnoff
NRC Office of Inspection and Enforcement
Washington, DC

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