

USNRC RECORD  
TTC  
DUKE POWER COMPANY

POWER BUILDING

422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

19 JUL 9 A10:11

WILLIAM O. PARKER, JR.  
VICE PRESIDENT  
STEAM PRODUCTION

TELEPHONE AREA 704  
373-4081

July 6, 1979

Mr. James P. O'Reilly, Director  
U. S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, Suite 3100  
Atlanta, Georgia 30303

Re: RII:JPO  
50-369, 50-370  
IE Bulletin 79-02, Revision No. 1

Dear Mr. O'Reilly:

Attached is our response to IE Bulletin 79-02, Revision No. 1, which was transmitted by your letter of June 21, 1979. The cyclic testing referred to in Responses 3 and 4 of the subject bulletin is scheduled to be completed and the results available by August 15, 1979.

A copy of this letter is being sent to the Director, Office of Nuclear Reactor Regulation, as Duke Power Company's response to Mr. Robert L. Baer's letter of November 29, 1978.

Very truly yours,

*William O. Parker Jr.*  
William O. Parker, Jr.

*by WAT*

THH:vr  
Attachment

cc: Director, Office of Nuclear Reactor Regulation

7909040065



790191

901002

ORIGINAL COPY

## McGUIRE NUCLEAR STATION

### Responses to USNRC IE Bulletin 79-02, Revision 1

July 6, 1979

McGuire Nuclear Station is in the later stages of construction and very near completion and fuel load of Unit #1. Essentially all pipe supports have been erected in Unit #1 and a large number have been erected in Unit #2. The following is a summary, by item, of the extent and manner in which Duke Power Company intends to satisfy Actions 1 through 4 of the IE Bulletin 79-02, Revision 1.

Response 1: Duke Power Company will account for base plate flexibility in the calculation of expansion anchor bolt loads for all Seismic Category 1 pipe support base plates using either a conservative hand calculation method which has been verified by non-linear finite element analysis or a specific non-linear finite element analysis for a particular base plate. The models and boundary conditions, including appropriate load displacement characteristics of the anchors, used for the finite element analyses, are based on Duke studies and on work performed by Teledyne Engineering Services which was sponsored by a group of thirteen (13) utilities formed to respond to generic items of IE Bulletin 79-02. All expansion anchor support plates designed prior to implementing these analysis methods are being reanalyzed accordingly and will be modified if required to comply with allowable anchor bolt loadings.

Response 2: The minimum factors of safety, between the expansion anchor bolt design load and the bolt ultimate capacity determined from static load tests, used in Duke's design of pipe supports, are as follows:

Normal Conditions	-	4
Upset Conditions	-	3
Faulted Conditions	-	2

These factors of safety are for wedge type and sleeve type expansion anchors. Some shell type anchors were used in the early stages of McGuire construction. Use of shell type anchors for Nuclear Safety Related applications was discontinued in February, 1975. Duke Power Company is now in the process of identifying all pipe supports using shell type anchors and the design of these supports will be reviewed to assure that a minimum factor of safety of five (5) is maintained.

McGuire Seismic Category I expansion anchor installations are restricted to normal weight structural concrete of varying strengths. Expansion anchor bolt ultimate load capacities are based on manufacturer's test results and recommendations for normal weight concrete and installed concrete strengths.

McGuire Seismic Category I expansion anchor designs properly account for shear-tension interaction, minimum edge distances and bolt spacing in accordance with manufacturer's test results and recommendations.

Response 3: Duke Power Company designs pipe supports to resist all applicable loadings including seismic loads, hydro test loads, normal operating loads, thermal loads, etc. A support is designed for a static or quasi-static load resulting from the most critical combination of the applicable loadings. The safety factors used for the expansion anchors are as specified in Response 2. Duke Power Company is now co-sponsoring tests performed by Teledyne Engineering Services to demonstrate that expansion anchors installed at McGuire Nuclear Station will perform adequately under both low cycle/high amplitude loading (seismic) and high cycle/low amplitude loading (operating). These tests are scheduled to be complete by July 15, 1979.

Response 4: Duke Power Company has developed and is continuing to develop sufficient documentation to verify that expansion anchors used in Nuclear Safety Related pipe supports are the correct size and type and are properly installed in accordance with manufacturer's recommendations. The following is a summary of documentation developed:

In February 1977, Duke Power Company initiated some random testing of installed expansion anchors. This testing was performed in response to concerns developing in the industry about improper installation practices. Based on these tests, Duke decided that a final inspection program for concrete expansion anchors would be implemented.

In March 1977, Construction Procedure CP-503 was issued for wedge, sleeve and self-drilling type concrete expansion anchor inspection. There were four criteria to be met; 1) spacing, 2) perpendicularity, 3) torque, and 4) embedment depth, except for self-drilling anchors which had no specified torque.

In June 1977, inspection was initiated to check anchors installed prior to issue of CP-503. All anchors for all pipe supports not having documentation in accordance with CP-503 were inspected in accordance with CP-503 and documented. A sampling of other types of attachments using expansion anchors was also made. A total of 4357 anchors were inspected, 2072 of which were pipe supports. This inspection was completed in September 1978.

In August 1977, QA Procedure M-52 was issued which supersedes CP-503 as the applicable inspection procedure for concrete expansion anchors. M-52 stated that only anchors greater than 5/8"Ø required torque inspection and this was later revised to all anchors with a specified torque greater than 100 ft-lbs. This reduction in torque inspection was based on the results of

the testing performed in which only 2 of the 4357 anchors failed to meet torque requirements.

In April 1975, Construction Procedure CP-308 was issued to provide control over the installation of concrete expansion anchors. This procedure has been updated periodically to reflect the experience gained by Duke through its inspection and testing programs.

Self-drilling shell type expansion anchors were installed in accordance with the manufacturer's recommended installation procedures. Adequate embedment depth and full expansion of the shell is assured since the anchor shell itself is used to drill its own hole and the shell is driven below the surface of the wall in the final installation step. Shell type anchors were inspected for size, type, perpendicularity, spacing and bolt snugness. Response 2 indicated that Duke is currently identifying all Seismic Category I pipe supports using shell type anchors. Once identified, Duke will implement a shell type anchor testing program, in accordance with IE Bulletin 79-02, latest revision, to supplement existing documentation. The parameters inspected will include thread engagement and shell shoulder to plug measurement in addition to pull testing.

Plate bolt hole size is specifically not inspected as part of the Duke expansion anchor inspection program. In response to Revision 1 of IE Bulletin 79-02, Duke inspected 331 bolt holes in 104 plates to confirm that plate bolt hole sizing was not a problem. Seven (7) plate bolt holes were found to be slightly undersized and 38 were found to be slightly oversized from design drawings. All of the plate bolt hole sizes were acceptable. Duke has concluded that this test sample provides reasonable and adequate assurance of proper plate bolt hole size.

In order to address the question of the relationship of cyclic/ load carrying capacity to installation procedure (anchor preload), the tests referred to in Response 3, being performed by Teledyne Engineering Services and sponsored by the group of thirteen (13) utilities, are being performed on anchors installed in accordance with manufacturer's recommended installation procedures and will have no more preload than is provided by the use of these procedures. Based on Duke's understanding of the behavior of expansion anchors and on cyclic testing which has been previously performed on various anchors, Duke Power Company is confident that the tests will show that the anchors will perform adequately.