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January 7, 1980

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

Re: Cherokee Nuclear Station
Docket Nos. 50-491, 492, & 493
IE Bulletin 79-02, Rev. 2
Duke Files: CK-1196.02, CK-1415.00, CK-1412.11-1

Dear Mr. O'Reilly:

Enclosed for your use is Revision 1 of Duke Power's response to IE Bulletin 79-02. This revises the response to IE Bulletin 79-02, Revision 1, contained in my letters of July 5, 1979 and August 15, 1979.

Very truly yours,

W. C. Dail
Vice President
Design Engineering

EKM/jmi

Attachment

cc: U. S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Division of Reactor Construction Inspection
Washington, D. C. 20555

ELECTRICITY FOR A PROGRESSIVE PIEDMONT
75th Anniversary
DUKE POWER 1904-1979

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CHEROKEE NUCLEAR STATION

Responses to USNRC IE Bulletin 79-02, Revision 2

Original: July 5, 1979

Revision 1: January 7, 1980

Cherokee Nuclear Station is in the early stages of construction and no pipe supports have been installed to date. The following is a summary, by item, of the extent and manner in which Duke Power Company intends to satisfy Actions 1 through 9 of IE Bulletin 79-02, Revision 2.

Response 1: Duke Power Company will account for base plate flexibility in the calculation of expansion anchor bolt loads for all Seismic Category I 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.

Response 2: The minimum factors of safety, between the expansion anchor design load and the anchor ultimate capacity determined from static load tests, used in Duke Power Company 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 which are the only types of anchors which will be used at Cherokee Nuclear Station for Nuclear Safety Related applications.

Expansion anchor installations for Seismic Category I piping supports are restricted to normal weight structural concrete of various nominal strengths. Expansion anchor ultimate load capacities are based on manufacturer's test results and recommendations for normal weight concrete and installed concrete strengths.

Cherokee Seismic Category I expansion anchor designs will pro-

perly 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 will be as specified in Response 2. Duke Power Company co-sponsored tests performed by Teledyne Engineering Services to demonstrate that the anchors procured for use at Cherokee Nuclear Station will perform adequately under both low cycle/high amplitude loading (seismic) and high cycle/low amplitude loading (operating loads). The final test report was generically submitted to USNRC for all Duke Power Company Nuclear Stations as described in Mr. L. C. Dail's (Duke) letter to Mr. J. P. O'Reilly (USNRC, RII) dated August 15, 1979 regarding Cherokee Nuclear Station.

Response 4: All expansion anchors used in Nuclear Safety Related applications will be either wedge type or sleeve type. The anchors will be inspected for proper installation in accordance with Duke Power Company's Quality Assurance Procedure M-52, "Concrete Expansion Anchor Installation Inspection". This procedure will assure that expansion anchors are properly installed in accordance with the manufacturer's recommendations.

Procedure M-52 criteria includes, but is not limited to, inspection of expansion anchor size, type, perpendicularity, torque, embedment depth, spacing, distance to free concrete edge and unauthorized modification of the anchor. Plate bolt hole oversizing is not specifically inspected for the following reasons:

1. Duke Power Company Quality Assurance Procedures prohibit deviations from design drawings and specifications without written authorization and approval by the Design Engineering Department.

2. Cherokee Nuclear Station will qualify each concrete expansion anchor operator by installation test and verbal examination on proper installation procedure.

As an additional precaution, Duke Power Company is currently revising Procedure M-52 to include visual inspection of connections for evidence of plate bolt hole oversizing. This inspection will be documented for each Nuclear Safety Related pipe support.

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, performed by Teledyne Engineering Services, and sponsored by the group of thirteen (13) utilities, have been performed on anchors installed in accordance with manufacturer's recommended installation procedures and 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 performed, Duke Power Company is confident that the anchors will perform adequately.

Response 5: Nuclear Safety Related/seismic pipe supports are prohibited from being attached to block (masonry) walls using concrete expansion anchors.

Response 6: A limited number of Nuclear Safety Related/seismic pipe supports installed with concrete expansion anchors do utilize structural shapes instead of base plates. These hangers are included in actions performed to satisfy the requirements of IE Bulletin 79-02.

Response 7: Cherokee Nuclear Station is currently under construction, therefore Bulletin Item 7 is not applicable.

Response 8: Cherokee Nuclear Station is currently under construction, therefore Bulletin Item 8 is not applicable.

Response 9: Those pipe supports which have not been installed are included in actions performed to meet the requirements of IE Bulletin 79-02 as outlined in Responses 1 through 6.

Revision 2 of Action Item 2 of the Bulletin requests verification by Duke Power Company that a uniform factor of safety was applied for all load combinations in the design of expansion anchors for Cherokee Nuclear Station. The expansion anchor design factors of safety utilized are outlined in Response 2 and are graded based on the normal, upset and faulted load combination. The gradation approach is consistent with design practices for other types of structures subject to the same load combinations.

There are no previously unreported instances in which Duke Power Company did not meet the revised (R2) sections of Action Item 4 prior to its issuance.