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VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
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October 7, 1983

Mr. James P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Re: RII:WCL
50-413/83-22
50-414/83-19

Dear Mr. O'Reilly:

Please find attached a response to Violation Nos. 413/83-22-01 and 413/83-22-02 as identified in the above referenced Inspection Report. Duke Power Company does not consider any information contained in this Inspection Report to be proprietary.

I declare under penalty of perjury, that the statements set forth herein are true and correct to the best of my knowledge.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

RWO/php

Attachment

cc: NRC Resident Inspector
Catawba Nuclear Station

Mr. Robert Guild
Attorney-at-Law
P. O. Box 12097
Charleston, South Carolina 29412

Palmetto Alliance
2135½ Devine Street
Columbia, South Carolina 29205

JPO/HBT/RWO
October 7, 1983

Duke Power Company
Catawba Nuclear Station

Violation:

10 CFR 50, Appendix B, Criterion III as implemented by Duke Power Topical Report "Duke-1-A", Section 17, paragraph 17.1.3, requires that design control measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled. The measures shall provide for verifying or checking the adequacy of design by calculational methods.

DPC QA Manual procedure PR-101, paragraph 1.1.8 requires that calculation shall include identification of sources of information, data, equations, etc., employed in the calculation. Paragraph 1.1.9 requires a complete presentation of the calculation such that anyone appropriately qualified could review the calculation. Paragraph 2.2.1 requires the checker to review data and design method used, to check the calculation step by step, and to check the activity and/or revisions for completeness, clarity, and accuracy.

Contrary to the above, design calculations for problems CN-1492-NB-152A, Rev. 1 and CN-1492-NB-267A, Rev. 3 did not meet the above requirements in that:

1. Sources of information, data, equations, appendices, applicable tables, etc., were not identified.

2. A complete presentation of the calculation such that anyone appropriately qualified could review the calculation was not available.

3. The checker failed to verify proper thermal load calculations for problem CN-1492-NB-152A and failed to correct anchor seismic load calculations for problems CN-1492-NB-152A and CN-1492-NB-267A for completeness, clarity, and accuracy.

Response:

1. We have reviewed the Notice of Violation, Report Nos. 50-413/83-22 and 50-414/83-19, and design calculations CN-1492-NB-152A and CN-1492-NB-267A and must deny the alleged violation for the following reasons:

   o Sources of information, data, equations, appendices, applicable tables, etc., were identified either by reference to the "Alternate Analysis Criteria for Reactor Building & Auxiliary Building Pipe and Supports" (Specification CNS-1206.02-04-0000, Rev. 5) at the beginning of the calculation or by specific reference within the body of the calculation as deemed appropriate. A description of specific references made in design calculations CN-1492-NB-152A and CN-1492-NB-267A is provided in Attachment 1.

- o A complete presentation of the calculation such that anyone appropriately qualified could review the calculation was available in both calculations reviewed. The calculations represent the application of the Alternate Analysis Criteria to specific piping configurations. The calculations do not represent a complete analysis but represent the results of the application of the criteria as a "cookbook" approach plus supplementary calculations performed in accordance with the criteria to account for specific considerations. Most of the work of the application process is presented on the marked piping ISOs and summary forms within the calculation package and is taken directly from appropriate tables within the criteria. It is not reasonable to expect the presentation of the application of a "cookbook" criterion to stand alone without considering the criterion itself as an integral part of that presentation. A reviewer must become familiar with the criterion itself and all the steps required for its application before attempting to follow the calculation which is primarily a presentation of results.

- o The alleged errors identified by the inspector in calculations CN-1492-NB-152A, Rev. 1 and CN-1492-NB-267A, Rev. 3 have been thoroughly reviewed and are not considered errors at all, but represent good engineering and appropriate application of the criteria. A complete technical discussion of the alleged errors is presented in Attachment 2.

2. Not Applicable

3. Not Applicable

4. Although we consider the referenced calculations to be in full compliance with applicable design control requirements, Duke Power Company's Quality Assurance Department will take steps to assure future compliance. The Quality Assurance Department has assured past compliance with all design control requirements through periodic audits and surveillance activities. Future audits and surveillances will be conducted with special emphasis on the items of concern expressed in the inspection report.

5. It is Duke Power Company's position that we are currently in full compliance with applicable design control requirements.

Description of References
Calculation CN-1492-NB-152A

Attachment 1

Within the calculation titled "Alternate Analysis Qualification CN-1492-NB-152A" (File No.: CNC-1206.12-21-2032) Rev. 1, reference is made to the Alternate Analysis Criteria and applicable drawings on page 1. Page 1A of the calculation contains statements regarding comparisons of this revision to the original calculation performed to Rev. 2 of the Alternate Analysis Criteria. Page 2 is a worksheet showing applicability of the Alternate Analysis Criteria. This shows the analyst referenced correctly the piping material (stainless steel), nominal size (3"), schedule (40), uninsulated tables, building and elevation case (Auxiliary building middle spectra) and reviewed stress intensification factors falling outside normal criteria usage (None). Page 3 uses the data of the previous page in chart form to reference Appendix B, Table B-4M-2 for appropriate span distances, reduction in span distances, minimum span distances and seismic and deadweight loads for both OBE and SSE loadings. This page also references Section 5.2.5A of the criteria for maximum run lengths. Page 4 is titled "Thermal Load Calculation" and uses formulae found only in Thermal Case 6 of the criteria. Page 6 shows subtitles for "Axial Supports Loads", Seismic Loads" and "Dead Weight Loads". Appendix D is referenced for the seismic loads on the anchor in this problem. Page 7 also references Appendix D Page D-4M.2 for moments on the anchor. Page 8 is a summary of loadings with reference to each support number. Page 9 has been deleted by a later revision to the analysis. Page 10 is a marked copy of the piping isometric analyzed showing each support location by support number.

Description of References
Calculation CN-1492-NB-267A

Within the calculation titled "Alternate Analysis Qualification of Support/Restraint Location and Determination of Support/Restraint Loads for CN-1492-NB-267A (File No: CNC-1206.12-21-2039) Rev. 3, reference is made to the Alternate Analysis Criteria and applicable drawings on page 1. Page 2 is a worksheet showing applicability of the Alternate Analysis Criteria. This page shows the analyst referenced correctly the piping material (stainless steel) nominal size (4"), schedule (40), uninsulated tables, building and elevation cases (Auxiliary Building lower and middle spectra) and reviewed stress intensification factors falling out ..de normal criteria usage (None). Page 3 uses the data of the previous page in chart form to reference Appendix B of the criteria for appropriate span distances, reduction in span distances, minimum span distances and seismic and deadweight loads for both OBE and SSE loadings. This page also references Section 5.2.5A of the criteria for maximum run lengths. Page 4 of the calculation references Thermal Case No. 6 of the criteria to calculate thermal stresses in the pipe. It also references criteria Section 4.1 of the criteria to determine pressure stresses. Page 6 is titled "Thermal Calculations" to denote beginning of that portion of the analysis. Page 7 is titled "Thermal Calculations Continued". Page 8 is titled "Thermal Load Summary Sheet." Page 10 is titled "Axial Support Loads with references to Lower and Middle Spectra Cases on Various Supports". Page 11 is titled "Deadweight Loads". Page 12

is titled "Summary of Loads on Anchor on CN-1492-NB267". Pages 13 and 14 are summaries of loadings with reference to each support number. Page 15 is a marked copy of the piping isometric analyzed showing each support location by support number.

Technical Discussion of Alleged Errors — Attachment 2
Calculations CN-1492-NB-152A, Rev. 1 and CN-1492-NB-267A, Rev. 3

1. The "Alternate Analysis Criteria for Reactor Building & Auxiliary Building Pipe and Supports" (Specification CNS-1206.02-04-0000, Rev. 5) requires that a pipe run which exceeds the maximum lateral support spacing from Appendix B must be axially restrained. This restraint can be accomplished by (1) the use of a lateral support near an elbow or (2) an in-line restraint such as lugs or an anchor. The reaction force is calculated using a spectra dependent coefficient. Section 5.2.5c provides different tables of coefficients for (1) and (2) above. Problem CN-1492-NB-152A contains an anchor for axial restraint and the anchor happens to be very near a piping offset. For this case the designer had a choice of either table from section 5.2.5c and chose to use the more conservative coefficients.

2. In problem CN-1492-NB-267A, Rev. 3 there is an anchor located 2'-9" from an elbow on a 24'-9" straight pipe run. The designer elected to use the entire run length to calculate thermal expansion, which is basically the length multiplied by the coefficient of thermal expansion, so that the worst case would be enveloped in the event of a revision to the anchor location. The checker saw no reason to modify the calculation, since the use of 24'-9" is obviously more conservative than using 22'-0".

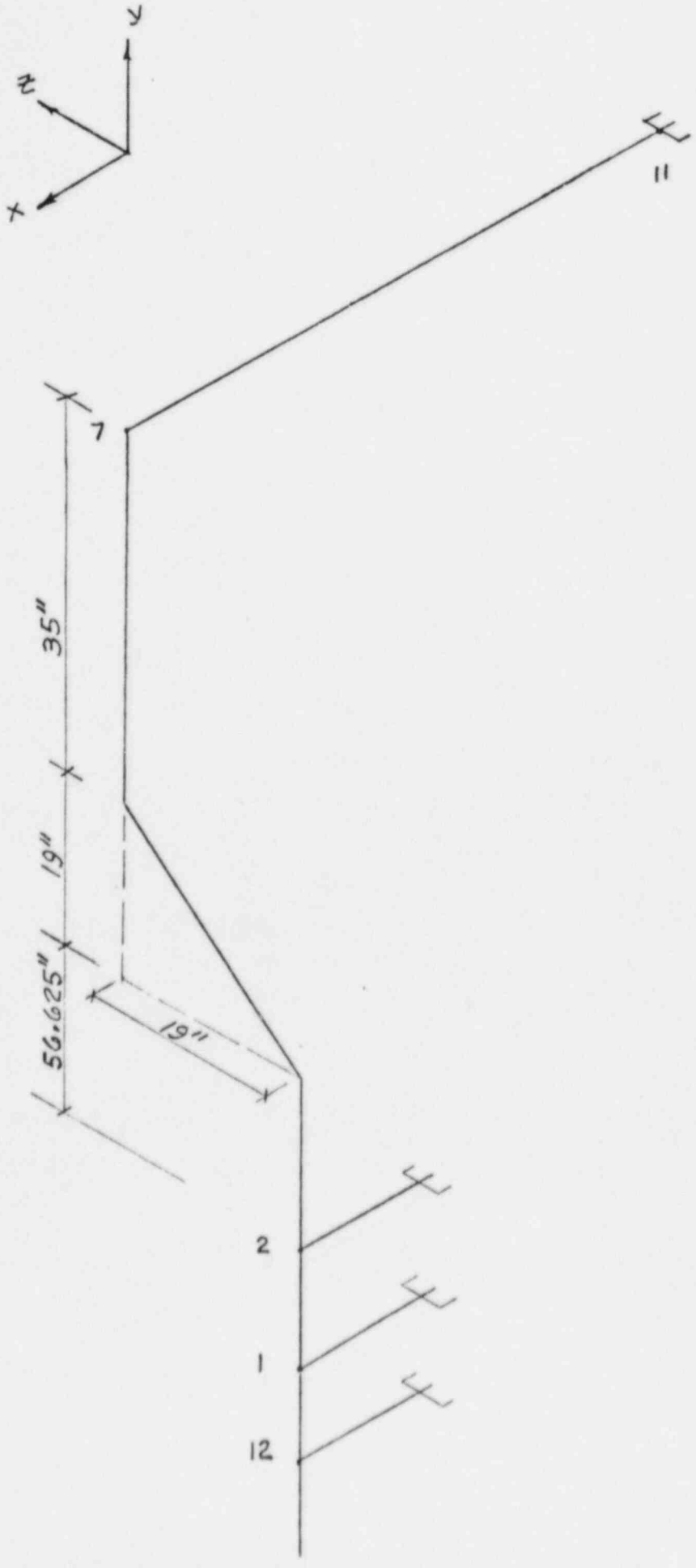
3. In problem CN-1492-NB-179A the thermal growth from the rigorous anchor on isometric CN-1492-NB-152A is absorbed into a piping run that contains a 45^{o} offset that is perpendicular to the thermal displacements. The criteria presents idealized piping configurations and it is the task of the designer to relate the actual configurations to the cases presented in the criteria. It has been the general practice of the Catawba Alternate Analysis Subgroups to use the summation of lengths of each section to determine the equivalent bending length whenever a bending leg contains an offset of 45^{o} or less, perpendicular to the thermal displacements. In order to verify the validity of this practice we have run a computer analysis of the segment of piping questioned using three different configurations. (See attached sketches). The thermal deflection of 0.3151 was input and the resulting force at the anchor was compared among the three cases and with the results of the force calculated by the designer in the calculation. The results are shown below:

		Force at Anchor
Case 1:	Computer run of the actual piping configuration including the 45^{o} offset.	61.76 lbs.
Case 2:	Computer run of the piping configuration with a straight run using the projected length of the offset (Method suggested by the inspector.	67.00 lbs.

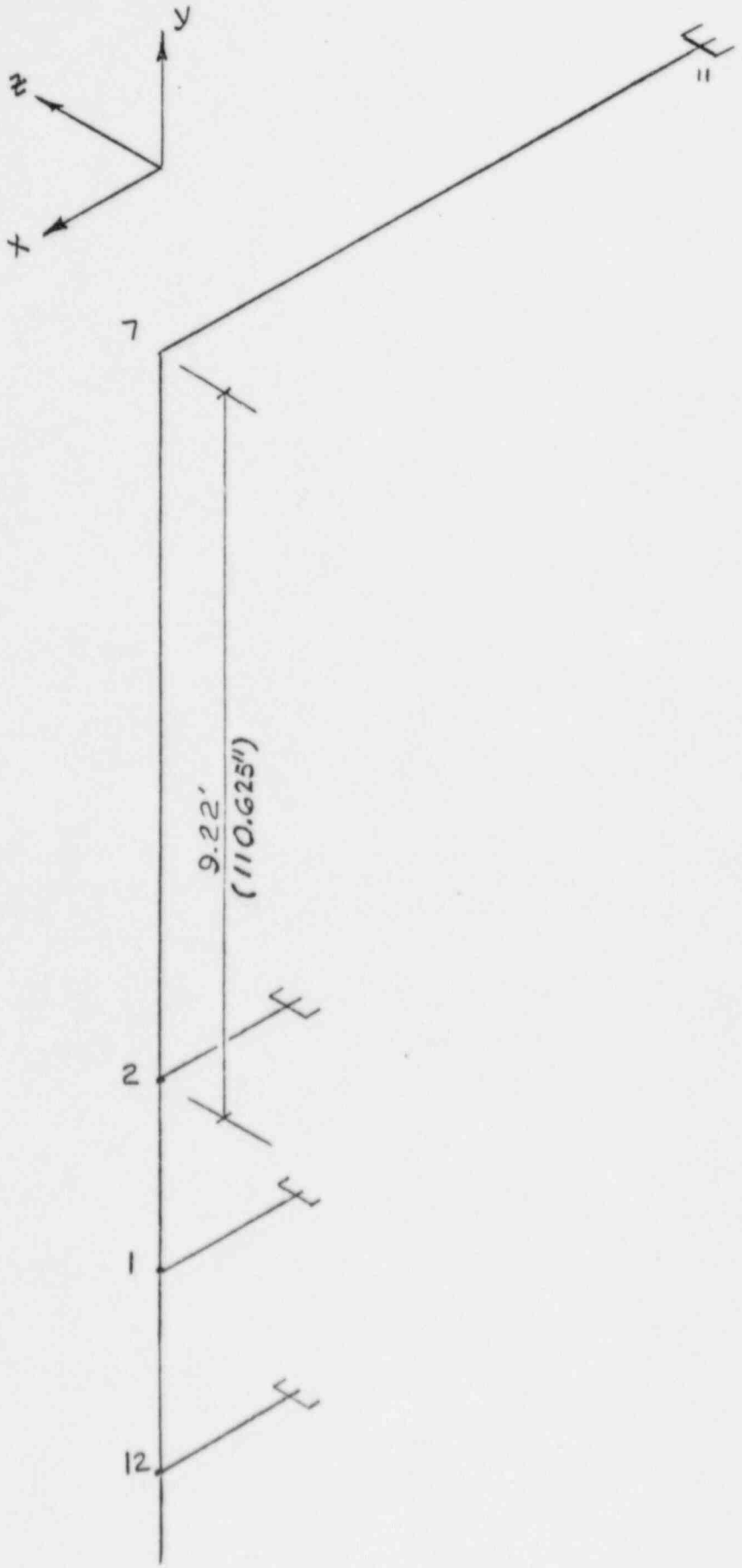
		Force at Anchor
Case 3:	Computer run of the piping configuration with a straight run using the summation of each piping segment lengths. (Method used in the calculation)	57.24 lb.
Case 4:	The use of the summation of each piping segment length for an equivalent length to be used in the Alternate Analysis Criteria. (Taken directly from calculation)	143 lb.

As can be seen from the results, Case 3 gives results closer to the results of Case 1 than does Case 2; and Case 4, which is the past and current practice, gives an extremely conservative approximation of the force as compared to either of the computer analyses.

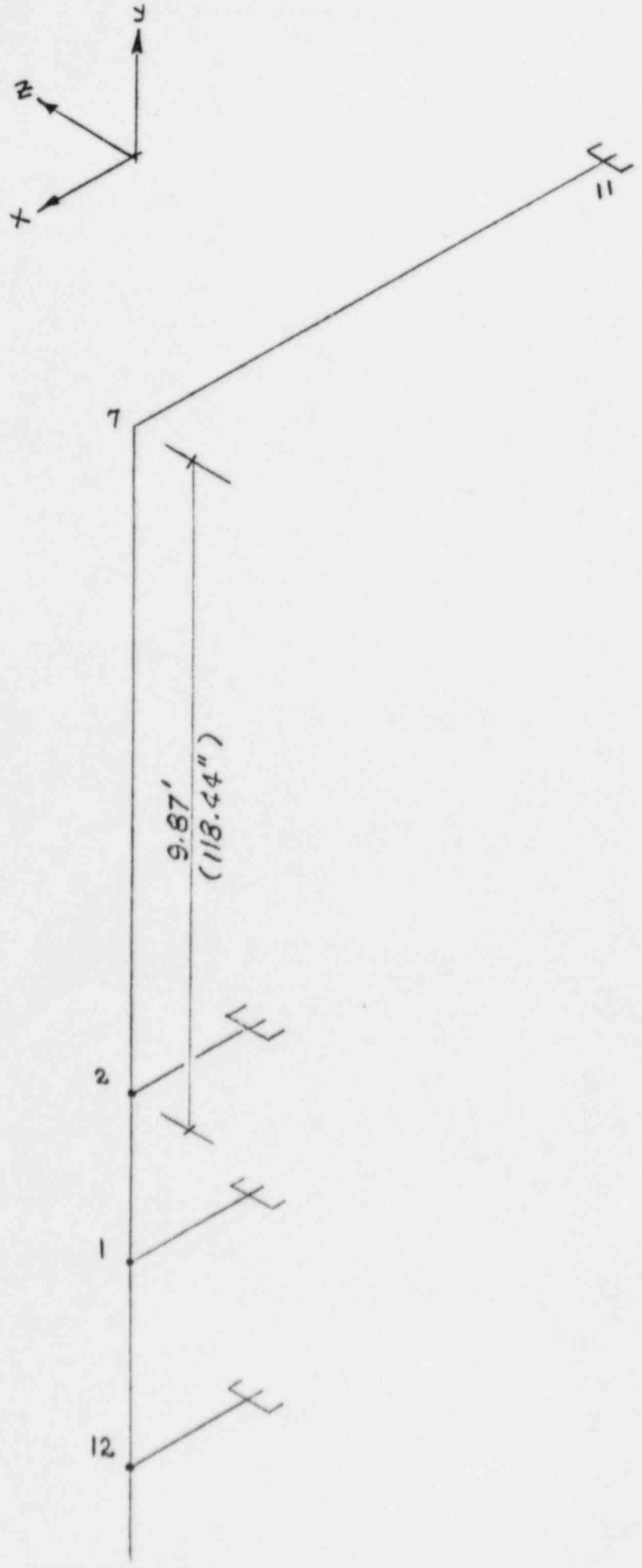
CASE 1



CASE 2



CASE 3



DUKE POWER COMPANY
Catawba Nuclear Station

Violation:

As a result of the inspection conducted on August 1-5, 1983, and in accordance with the NRC Enforcement Policy, 47 FR 9987 (March 9, 1982), the following violation B was identified.

> 10 CFR 50, Appendix B, Criterion V as implemented by Duke Power Company (DPC) Topical Report "Duke 1-A", Section 17, paragraph 17.1.5, requires in part that activities affecting quality be accomplished in accordance with instructions, procedures, or drawings. Hanger drawing 1-R-KC-0392, Revision 5 requires that the sway angle for the snubber be limited to on maximum of 1°.
>
> Contrary to the above, activities affecting quality were not being accomplished in accordance with documented instructions, procedures or drawings in that QC accepted hanger no. 1-R-KC-0392, Rev 5 was not installed within the maximum 1° tolerance. The actual measurement for the sway angle was 2.1°.

Response:

1. The QA inspections group inspected and accepted hanger number 1-R-KC-0392 with the sway angle outside of the tolerance required by Design Engineering.

2. The reason for this error was that the personnel misinterpreted the requirement for this sway angle. The sway angle was placed on a drawing variance by Design. The variance stated "limit the sway angle to 1°. The personnel interpreted the statement as meaning that the angle was supposed to be 1° plus the appropriate tolerance. The intent was for the sway angle to be 1° maximum.

3. Support Number 1-R-KC-0392 has been reworked to bring it into compliance with the design drawing.

The responsible craftsman and QA inspector have been cautioned on this discrepancy.

A sample of 50 previously inspected hanger packages were inspected to determine if this was a prevalent problem. One additional error was found with a sway angle however it was attributed to an unrelated situation (NCI 16968).

As a result of discussions with other inspectors, who properly interpreted the design information, and the fact the sample substantiated this was not a prevalent problem, we conclude that this was an isolated error.

4. No further corrective steps are required.

5. Full compliance has been achieved.