TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

5N 157B Lookout Place

DEC 04 1989

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

SEQUOYAH NUCLEAR PLANT - ALTERNATE ANALYSIS PROGRAM PHASE II - PROGRAM REVISION

Reference: TVA letter to NRC dated April 8, 1987, "Sequoyah Nuclear Plant - Alternate Analysis Program Phase II"

In the referenced letter, we described in detail the initial plans for Phase II of the alternate analysis program. Since that time, we have gained experience in the implementation of the program, and we believe the work process can be simplified without altering the intended purpose of the program. We discussed this proposal with the NRC Staff in a meeting in Rockville, Maryland, on November 9, 1989. A description of the revised program evaluation process is included as an enclosure. The evaluation methods and the acceptance criteria are discussed. TVA proposes to meet with you in early December to discuss example documentation packages if you desire.

If you have any questions concerning this, please telephone M. J. Burzynski at (615) 843-6422.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

M J Ray for

Manager, Nuclear Licensing and
Regulatory Affairs

Enclosure
cc: See page 2

D030
1/1

U.S. Nuclear Regulatory Commission

DEC 04 1989

cc (Enclosure):
Ms. S. C. Black, Assistant Director
for Projects
TVA Projects Division
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

Mr. B. A. Wilson, Assistant Director
for Inspection Programs
TVA Projects Division
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

NRC Resident Inspector
Sequoyah Nuclear Plant
2600 Igou Ferry Road
Soddy Daisy, Tennessee 37379

ENCLOSURE

SEQUOYAH NUCLEAR PLANT

ALTERNATE ANALYSIS PIPING PROGRAM - PHASE II

PROGRAM REVISION

Background

As part of the restart effort at Sequoyah, TVA developed a program to evaluate the adequacy of alternately analyzed piping and to correct identified deficiencies. The program had two phases: a restart phase (Phase I) and a postrestart phase (Phase II). TVA committed to complete Phase II of the program by the end of the Cycle 4 refueling outage for each unit.

The program plan that was submitted to NRC described the scope, evaluation methods, and schedule in some detail. As a result of work performed to date, TVA believes that a more efficient approach can be used to satisfy the intended purpose of the alternate analysis program. No changes are proposed for the scope or schedule. However, the revised approach differs from the detailed description provided in the original program plan.

Phase I of the program addressed potential short-term safety concerns on piping in accident mitigation/safe shutdown systems or portions of systems. Phase I of the program was completed for restart of each unit. Phase II of the program addresses postrestart issues for the Phase I scope and extends evaluations to Category I piping and tubing outside the restart boundaries. This phase of the program is designed to bring the piping and tubing into full compliance with the design criteria.

Phase II Program Status

The scope of the Phase II effort for small-bore piping includes approximately 600 evaluation packages that encompass 40,000 linear feet of piping and 6,300 supports. The scope of the instrument and control portion of the program includes approximately 1,200 evaluation packages that encompass 170,000 linear feet of lines and 30,000 supports.

The status of the program as of October 11, 1989, is as follows:

Unit 1 Walkdowns:	Process Piping	Complete
	Instrument Lines Outside Containment	Complete
	Instrument Lines Inside Containment	December 1989
Unit 2 Walkdowns:	Process Piping and Instrument Lines Inside Containment	Complete
	Process Piping and Instrument Lines Outside Containment	July 1990

Unit 1 Process Piping Analysis:

- 250 packages (2,500 supports) have been evaluated

- 60 packages required detailed evaluation as a result of engineering review

- 59 modifications identified

Unit 1 Sampling and Radiation Monitoring Lines:

- 80 packages (3,200 supports) have been evaluated

- 138 clamp changes and modifications identified

Unit 1 Sense Lines and Control Air Lines:

- 380 packages (7,600 supports) have been evaluated

- 78 clamp changes and modifications identified

No operability concerns have been identified with the work completed to date.

Program Reassessment

A review of the process piping and instrument and control data indicates that the lines are generally well supported. In addition, instrument line hangers generally have large reserve margins. The problems encountered with process piping can be discerned by an experienced analyst through a review of piping and support geometry. The problems encountered include the following:

- Thermal binding (insufficient flexibility)

- Interface movements with other piping and differential building movements

- Seismic overstress (unsupported axial runs, overspan, and concentrated mass)

- Eccentric masses (valve operators)

- Deadweight piping interfaces (seismic to position retention interfaces)

The majority of the process piping support configurations can be enveloped by typical support drawings. Many of these supports can be qualified in the field by comparison with the typical drawings and justifying variances.

The problems encountered with instrument and control lines can also be discerned by an experienced analyst through a review of the piping and support geometry. Typical problems encountered include the following:

- Restrained thermal growth for high-temperature lines
- Overrestraint of anchor point movements
- Insufficient longitudinal support in high seismic zones
- Insufficient support of large valves

As a result of the nature of the findings to date, TVA believes that a more efficient process can be used to meet the intended purpose of Phase II of the alternate analysis program. The program changes are discussed below.

Process Piping Evaluation

TVA will use typical support drawings developed for 2-inch and smaller piping wherever possible in lieu of the implied commitment that individual support drawings will be developed. Variances to these standard designs are identified and evaluated.

Each process piping package is evaluated by a senior engineering review team. The evaluation process makes extensive use of "prequalified" spans. The TVA procedure, "SQN-AA2-001 - Sequoyah Nuclear Plant Units 1 & 2 Alternate Analysis Review Program Screening and Evaluation Criteria for Piping and Instrument Lines," provides criteria, prequalified piping spans by line size and plant location, support loads, and other related design rules for alternately analyzed piping. SQN-AA2-001 provides standard spans for straight runs of piping, reduced spans for piping with concentrated weights, and support loads for two separate plant areas (i.e., high and low seismic areas) for each pipe and instrument tubing size. To provide a uniform application of the criteria, a small team of senior-level engineers performs the initial evaluation of the field walkdown packages. For each package reviewed by the senior review team, a comprehensive checklist is completed. This checklist (copy attached) was formulated considering the alternate analysis Phase I and Phase II attributes. Conservative standard loads have also been developed for various pipe sizes.

Areas that do not comply with SQN-AA2-001 are noted in the review package. If the noncompliances can be qualified by additional minor calculations, these are performed and attached to the review package.

Support loads will be identified for the supports within the packages. These support loads will be based on loads generated from the standard spans or from the hand calculations performed. For packages that require lengthy calculations to demonstrate compliance, a list of attributes within the package that require further review is prepared and provided to the production group for the detailed assessment. This detailed list of attributes permits

the production group to concentrate on those areas that do not comply with the criteria and minimizes redundant review of the areas that are in compliance with the criteria.

The checklist, supplemental computations, and support load summaries will be incorporated into formal calculations on a system basis upon completion of the initial assessment phase of the current effort. These calculations will serve as the final documentation for those packages found acceptable. References to the appropriate production group calculations will also be included.

The standard screening load concept was developed as part of the requalification of the standard (typical) supports used extensively for 2-inch and smaller piping. During the requalification of these supports, each was load rated, and these load ratings then formed the basis for the screening loads. Screening loads are also used for 2-1/2 inch to 4-inch piping and were developed from capacities of standard support components. Screening loads for all sizes are used as "target" loads with unique load tabulations being developed for locations where screening loads are exceeded.

The predominant use of load-rated standard (typical) supports has greatly reduced the engineering associated with the requalification of these supports for 2-inch and smaller piping. The evaluations required for these supports are limited to detailing the variations from the standard design and assessing the impact of the variation. Complete walkdowns and evaluations are performed for supports for 2-1/2-inch and larger piping.

Instrument and Control Evaluations

TVA will screen the instrument and control lines and supports using engineering drawings in lieu of field walkdowns. The screening criteria used are as follows:

- Temperatures greater than 200 degrees Fahrenheit
- Endpoint movements greater than 1/2 inch
- High seismic response
- Large in-line valves

TVA will perform engineering walkdowns of those lines identified in the screening process. Based on the walkdowns, areas requiring further analysis will be sketched. These problem areas will be evaluated using the engineering evaluation process identified for process piping.

In lieu of the sampling program for supports outside the areas identified by the drawing review, TVA will conduct a visual inspection of the instrument and control lines on a room by room basis to identify outlier configurations. Areas identified by these observations will be evaluated using the same evaluation process identified for process piping.

Employee Concern Element Report

TVA has reviewed relevant employee concerns (both open and closed) for impact by the proposed program changes. The following element reports were identified:

Element Report 173.03, Instrument Line Changes
Element Report 212.02, NRC Bulletin 79-14, As-Built Review Program
Element Report 218.01, Thermal Analysis of Piping Subjected to Temperature Less Than 120 Degree Fahrenheit
Element Report 218.04, Widespread Deficiencies Within Pipe Stress Calculations
Element Report 218.07, Acceptance Criteria for Overlap Areas of Calculations
Element Report 220.11, Temperature Variation Consideration

The revised program plan does not affect the corrective action for open employee concerns on the basis for closure of closed employee concerns.

Estimated Cost Savings

Using walkdown typical drawings for process piping in lieu of developing as-built drawings for each support is estimated to save 15,000 man-hours of work. Piping analysis evaluation by the senior engineering review team using standard support loads instead of performing production group calculations of each package results in an estimated savings of 10,000 man-hours. Standard support variance analysis instead of individual support calculations is estimated to save 25,000 man-hours.

Summary

As a result of the experience to date implementing Phase II of the alternate analysis program, TVA believes that a more efficient process can be used to meet the intended purpose of the Phase II program. The review to date indicates that the lines are generally well supported. The problems encountered can be discerned by experienced analysts through a review of piping and support geometry. The revised approach takes advantage of typical drawings and standard support loads. Documentation packages are being developed for each review package to fully document the evaluation. The revised program results in considerable savings to TVA without altering the intended purpose of the alternate analysis program.

_____ Sheet _____ of _____

Prepared _____ Date _____ Checked _____ Date _____

___ / ___

SCREENING REVIEW SUMMARY AND RESULTS

ANALYSIS PACKAGE _____

PIPING ANALYSIS

[ ] No further evaluation is required.

[ ] Further evaluation is required as noted below.

_____

_____

_____

SUPPORT LOADS

[ ] Screening loads apply for all supports not previously evaluated (Phase I or other).

[ ] Screening loads apply except as noted below. Support loads are [ ] attached [ ] to be determined by analysis.

[ ] All support loads are to be determined by analysis.

_____

_____

SUPPORT MODIFICATIONS AND CLAMP CHANGES

Note: Support modifications and clamp changes which may be required for support attributes are addressed separately in accordance with SQN-AA2-002.

[ ] No support modifications or clamp changes are required due to piping attributes.

[ ] Support modifications and/or clamp changes necessary to assure piping qualification are noted on the attached. Analysis confirmation is [ ] required [ ] not required.

[ ] Support modifications and/or clamp changes (if required) are to be determined by analysis.

_____

_____

_____ Sheet _____ of _____

Prepared _____ Date _____ Checked _____ Date _____

___ / ___

SCREENING REVIEW

ANALYSIS PACKAGE _____

			Analysis Required
SCOPE			
1.	High energy piping > 1" nominal diameter?	Yes/No	Yes/No
2.	Piping/supports rigidly attached to SCV?	Yes/No	Yes/No
3.	Pipe nominal diameter > 4"?	Yes/No	Yes/No
THERMAL EXPANSION/ANCHOR MOVEMENT FLEXIBILITY			
4.	Operating temperature > 120F or < 20F?	Yes/No	Yes/No
5.	Connection to run line or equipment?	Yes/No	Yes/No
6.	Piping supported from more than one independent structure?	Yes/No	Yes/No
SEISMIC			
7.	MOVs/POVs/FSVs?	Yes/No	Yes/No
8.	Excessive span lengths?	Yes/No	Yes/No
9.	Unsupported long axial runs?	Yes/No	Yes/No

_____ Sheet _____ of _____

Prepared _____ Date _____ Checked _____ Date _____

___ / ___

SCREENING REVIEW

ANALYSIS PACKAGE _____

			Analysis Required
SEISMIC (Cont'd)			
10.	Interface with class G or lower piping?	Yes/No	Yes/No
11.	Valves with remote handwheel operators?	Yes/No	Yes/No
12.	Unsupported flexible branch lines?	Yes/No	Yes/No
13.	Piping rigidly attached to RCL?	Yes/No	Yes/No
COMPONENTS			
14.	Flexible valves?	Yes/No	Yes/No
15.	Flex hose?	Yes/No	Yes/No
16.	Pipe sleeve seals?	Yes/No	Yes/No
17.	Field fabricated branch connections?	Yes/No	Yes/No
18.	Relief valves?	Yes/No	Yes/No

_____ Sheet _____ of _____

Prepared _____ Date _____ Checked _____ Date _____

___ / ___

SCREENING REVIEW

ANALYSIS PACKAGE _____ _____

		Analysis Required
COMPONENTS (Cont'd)		
19. Clearance problems?	Yes/No	Yes/No

SPECIFIC COMMITMENTS

20.