

YANKEE ATOMIC ELECTRIC COMPANY



1671 Worcester Road, Framingham, Massachusetts 01701

June 1, 1987
FYR 87-056

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Attention: Ms. Eileen McKenna, Project Manager
Project Directorate I-3
Division of Reactor Projects I/II

References: (a) License No. DPR-3 (Docket No. 50-29)
(b) Letter from USNRC to YAEC (NYR 87-79), dated April 27, 1987

Subject: SEP Topic III-6, Commitment Summary

Dear Ms. McKenna:

As you requested during our meeting on April 14, 1987, Yankee has prepared the attached summaries of seismic-related engineering and plant modifications to be completed following issuance of the SER. These engineering tasks and plant modifications result from our mutual evaluations of the seismic capacity of safe shutdown system structures and components within Yankee Nuclear Power Station (YNPS).

Yankee has already completed many seismic analyses and plant modifications. The activities listed in the attachments constitute all of the work remaining to complete SEP Topic III-6 for YNPS. Detailed descriptions of both completed and pending engineering and modifications have already been docketed.

It is our intention to perform these activities after the staff has issued the definitive seismic safety evaluation report for YNPS. Furthermore, these commitments are based on our current understanding of the staff's disposition of these seismic related issues. Significant changes in the final resolution of these issues may necessitate our complete re-evaluation of these commitments.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

John D. Roseltin for
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Attachments

cc: USNRC Region I
USNRC Resident Inspector, YNPS

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ATTACHMENT 1

Summary of Engineering and Plant Modifications Remaining to Complete SEP Topic III-6

1. Analyze and design seismic supports for the Main Steam and Feedwater (MS/FW) piping outside containment. Modify, as necessary, the support structure and the nonreturn valve enclosure for seismic loads. Qualify the MS/FW vapor container penetrations for the seismic loads based on the new Soil-Structure Interaction (SSI) model with horizontal soil springs. Nuclear Regulatory Commission (NRC) site-specific spectra and the associated detailed MS/FW criteria will be used.
2. Analyze and design seismic supports for large and small bore Safe Shutdown System (SSS) piping inside containment. A detailed work scope, based on the results of our April 13-14 meeting, is presented in Attachment 2.
3. Install seismic supports for the feed and bleed heat exchangers, and the concrete block wall surrounding them inside the containment. This is the only block wall inside containment. The NRC spectra will be used.
4. Add bracing to the legs of the component cooling surge tank in the upper level PAB. The NRC spectra will be used.
5. Install seismic modifications to the Diesel Generator Building including new diagonal bracing. Modify two existing structural steel connections to seismically decouple the PAB and DGB.
6. Install seismic modifications to the PAB structural steel frame. This building has been subjected to confirmatory analysis using NRC spectra. The Column G-8 connection and beam-to-shear wall connections will be redesigned using the new Hilti catalog with a safety factor of 4.0 for concrete expansion bolts. The NRC spectra will be used.
7. Analyze and design seismic supports for all large and small bore SSS piping outside containment. NRC site-specific spectra and the associated DC-1, Revision 4, criteria will be used. A detailed workscope, based on the results of our April 13 and 14, 1987 meeting, is presented in Attachment 2.
8. Investigate the Neutron Shield Tank (NST) support mechanism to determine the potential for movement of the reactor pressure vessel under the NRC spectra seismic load. If necessary, design a support modification to preclude such motion. It has previously been demonstrated that the NST will not slide under Yankee Composite Spectra (YCS) seismic loads.
9. Resolve the issue of potential seismically-induced dynamic uplift loads on the steam generator support legs. These loads are based on the NRC spectra. Either of two solutions will be employed. The gap in the support legs hold down mechanism will be adjusted to a maximum of

ATTACHMENT 1
(continued)

Summary of Engineering or Plant Modifications Remaining
to Complete SEP Topic III-6

1/8 inch. The second alternative is to perform a time history, or other conventional analysis, which demonstrates that no element of the support mechanism, including the Lubrite plates, is overstressed.

10. The seismic evaluation of SSS conduit, cable trays, and miscellaneous mechanical/electrical equipment will be performed through the resolution of USI A-46 utilizing SQUG. The NRC spectra will be used in the Generic Implimentation Plan. Any necessary plant modifications will be made in conjunction with that program.
11. Two additional structural steel members will be added to support the upper level north block wall of the PAB. These will be designed to remain elastic under NRC spectra loads. A thorough walkdown of the plant will be performed to confirm that all block walls which could affect SSS components have been identified. This walkdown will conform to the requirements of IEB 80-11. If any new walls are identified by this walkdown, they will be analyzed and modified as necessary. If new structural steel is needed it will be designed to remain elastic under NRC spectra loads. In lieu of NRC loads, twice YCS loads may be used.
12. An investigation will be performed to determine if the strap anchors in the north wall of the PAB are solidly grouted. If not, then grout will be added or another acceptable structural solution will be implemented.
13. All U-bolts used as axial restraints on piping will be included in the In-Service Inspection Program.
14. IE Information Notice 86-94 regarding 1/2-inch diameter Hilti Bolts will be addressed through normal plant procedures for these notices.
15. The effect of lateral seismic loads on vertical-only small bore pipe supports will be evaluated. Support modifications will be made if necessary. Displacements based on either the NRC spectra or twice the YCS spectra will be used.
16. New amplified response spectra will be generated for the vapor container using the most recently developed soil springs and the NRC spectra.
17. The Seismic Reevaluation and Retrofit Criteria Document, DC-1, Revision 4, will be revised as follows:
 - a. On page 11, the reference to 20 KSF ultimate soil bearing capacity for the VC and RSS will be deleted. The foundation analyses for these structures have been resolved on a case by case basis.

ATTACHMENT 1
(continued)

Summary of Engineering or Plant Modifications Remaining
to Complete SEP Topic III-6

18. On May 22, the staff requested that all piping problems qualified to YCS be checked to the NRC spectra levels. Specifically, the request was made to double the YCS seismic stresses on piping and compare to the NRC spectra level allowable. Strain criteria, per DC-1, Revision 4, may be used. Also, it was requested that concrete expansion anchors in the affected piping system supports be checked to ensure that they have a minimum safety factor of 4.0 under twice the YCS load. The NRC has stated that bolts with a safety factor greater than 2.0 are acceptable on an interim basis. These two checks will be performed on all piping systems identified with an asterisk (*) in the left-hand margin on Attachment 2. In lieu of this check, each system may be analyzed using the NRC spectra with the DC-1, Revision 4, criteria.

Buried piping and Dedicated Safe Shutdown System piping in the PAB have been found acceptable by the staff and are excluded from this commitment.

If the piping resolution strategy involves developing "new YCS SAMs and inertia" forces, the soil strain parameters and soil-structure model used to generate these values will be submitted to the staff for their review. This review has already been completed for the NRC spectra.

19. In the future, major modifications to existing SSS piping systems and new SSS piping systems will be designed to DC-1, Revision 4 criteria using NRC spectra.

ATTACHMENT 2

Based on our meeting of April 13-14, 1987, the two remaining technical questions in the piping area concern U-bolts and gang supports for small bore pipe. Yankee will employ one of the following resolution strategies for each issue.

A. Use of U-Bolts as Axial Restraints

Any one of the following three options are considered acceptable to justify the use of U-bolts as axial restraints:

1. Use existing test data from outside sources to corroborate the allowables determined in the YNPS analyses.
2. Devise and perform a test program to corroborate the calculated allowables.
3. Replace U-bolts.

In addition, it was agreed that an ISI Program would be implemented in association with Options 1 and 2 to check U-bolt preload on a regular basis (Attachment 1, Item 13).

B. Small Bore Piping Gang Support Design Criteria

Design loads from nonseismic lines attached to seismic gang supports shall be determined by one of the following four methods:

1. Measure the span length of the nonseismic line, take the tributary weight on the gang support \times peak ARS \times 1.5 and use this value as the support load.
2. Perform seismic analyses of the nonseismic lines and use resulting support loads.
3. Compare seismic and nonseismic lines. Demonstrate that geometric similarity is sufficient to justify use of the support loads from the analysis of the seismic line.
4. Perform dynamic analyses of a representative sample of nonseismic lines to justify using support loads from the analysis of the seismic line.

The following table provides the current status of all large and small bore SSS piping. Each system analysis has been categorized as either: adequate as is; adequate with specific changes; or to be analyzed to DC-1, Revision 4, criteria.

Piping Status

<u>Piping System</u>	<u>Description/Boundaries</u>	<u>Status/Resolution Strategy</u>
*Main Steam Lines Inside VC (Problems 001 to 004)	Piping from SG to VC Penetration for 4 Loops	Loops 1 and 4: Reanalyze using new YCS SAMs and inertia. Loops 2 and 3: Reanalyze for YCS using DC-1, Revision 4, criteria and new YCS SAMs, and inertia.
Main Steam Lines from VC to Anchor A-50	Piping from VC to Anchor A-50 on MS/FW Support Structure for 4 Loops	Will be analyzed using DC-1, Revision 4, criteria with NRC spectra.
Main Steam Lines Beyond Anchor A-50	Piping from Anchor A-50 to Turbine Generator for 4 Loops	Not part of SSS. Will be analyzed to ensure integrity of adjoining piping.
*Boiler Feed Discharge Line Inside VC (Problems 021 to 024)	Piping from SG to VC Penetration 4 Loops	Loops 1 and 4: Reanalyze using new YCS SAMs and inertia. Loops 2 and 3: Reanalyze for YCS using DC-1, Revision 4, criteria and new YCS SAMs and inertia.
Boiler Feed Discharge from VC to Turbine Building	Piping from VC to Turbine Building Penetration	Not part of SSS. Will be analyzed using DC-1, Revision 4, criteria with NRC spectra.
Main Coolant Piping	MCL Piping for 4 Loops	OK per confirmatory analysis.
Pressurizer Safety and Relief Piping	PZR Safety and Relief Piping	OK per current analysis to NRC spectra.
Safety Injection Piping (Problems 201 and 207)	MCL Tap-Off to VC Penetration 4 Loops	OK with reanalysis using NRC spectra with DC-1, Revision 4 criteria.

Piping Status

<u>Piping System</u>	<u>Description/Boundaries</u>	<u>Status/Resolution Strategy</u>
*Shutdown Cooling Piping (Problems 121 and 122)	MCL Tap-Off to VC Penetrations	OK with reanalysis using new YCS SAMs and inertias.
Main Coolant Bleed from VC to LPST	VC to Low Pressure Surge Tank in PAB	Will be analyzed to DC-1, Revision 4, with NRC spectra.
*Feed and Bleed Hx, Charging, Safety Injection Drains (SP-FB-5)	3/4" DRH-2502-14 from Hx Cross-Connect Piping, 3/4" DRH-2502-17 from 2" CRCH-2502-3, 3/4" DRH-2502-18 from 8" PRSH-2502-6, all to Drain Header 2" DRH-2502-1 (Reference Drawing 9699-FP-44E)	OK with reanalysis using the following modeling: a) Model in portion of 8" PRSH-2502-6. b) Use VC spectra @ connection to 2" DRH-2502-1 (new YCS spectra). c) Consider rotational and translational SAMs. d) Use 100% SAMs. e) Model in 2" CRCH-2502-3.
*RC Loop Safety Valve Discharge (SP-RCL-17 to 19)	1" BRL-302-2, 3, and 4 from Bypass Line to Clamp Anchor for 3 Loops (Reference Drawing 9699-FP-38E)	OK per current analysis.
*Loop 4 Safety Valve Discharge and Charging Relief (SP-RCL-20)	1" BRL-302-5 from Loop 4 Bypass Line (5" CRB-2502-4) to 6" BRL-302-6, 1" BRL-302-9, 2" CRCH-2502-4 from 20" CRM-2504-10 to HX-E-8-4, 1" CRCH-2502-4 from 2" CRCH-2502-4 to 1-1/4" CRB-2502-6, 1-1/4" CRB-2502-6 from RC Loop 2 to PZR, 3/4" DRH-2502-19 from 2" CRCH-2502-4 Past Support DRH-R-13 (Reference Drawing 9699-FP-10)	OK with reanalysis using the following: a) Use 100% SAM. b) Include 3/4" DRH-2502-19 in model. c) Use VC SAM and inertia for 6" BRL tap-off (new YCS Sam and inertia). d) Insure 6" BRL-302-6 rigidity near tap-off.
*Pressurizer Spray (SP-PZR-7)	Included Above	Included in "Loop 4 safety valve discharge and relief" piping.

Piping Status

<u>Piping System</u>	<u>Description/Boundaries</u>	<u>Status/Resolution Strategy</u>
*Charging and Auxiliary Pressurizer Spray (SP-CH-3)	Included Above	Included in "Loop 4 safety valve discharge and relief" piping.
*Charging Through Drainbox (SP-CH-2)	Charging Line from HX-E-8-1, to VC Penetration 2" CRCH-2502-3 (Reference Drawing 9699-FP-44E)	Included with feed and bleed Hx, charging, SI drains.
*Pressurizer Sample and Vent (SP-PZR-2ab)	3/4" CRM-2502-5 to 3/4" CRU-2502-5 to Capillary Tubes, 1" VRH-2502-1 to Support VRH-H-1	OK with reanalysis using new YCS SAMs and inertia using 100% SAMs.
*Hot and Cold Leg Drains, Pressurizer Drain, Drain Header (SP-RCL-9 to 16, SP-PZR-1, and SP-DRH-1)	Drain Line from all 4 Loops, PZR Drain, and Drain Header	OK with reanalysis using 100% SAM, and new YCS SAMs and inertia.
*Charging and Bleed Drain and HP Sample (SP-CH-1ab)	3/4" CRSH-2502-3 from 2" CRBH-2502-1, 1/2" CRCH-2502-1, 3/4" DRH-2502-19 from Sample Cooler to 2" DRH-2502-19 (Drain Header) (Reference Drawing 9699-FP-44E)	Included with "bleed lines from Hx."
*Steam Generator Blowdown (SP-SG-9 to 12 and SP-BD-1)	Blowdown and Auxiliary FW Lines from 8" FW and SG to VC Penetration	OK with reanalysis which generates ARS for connections to 8" diameter feedwater line, uses 100% SAM, and new YCS SAMs and inertia.

Piping Status

<u>Piping System</u>	<u>Description Boundaries</u>	<u>Status Resolution Strategy</u>
* To Hx Bleed Lines to and from Hx (SP-FB-2ab and SP-FB-1)	2" CRBH-2502-1 from HX-E-8-4 to Loop 1 Cold Leg (Reference Drawing 9699-FP-44E)	OK with reanalysis which incorporates the following: a) Include 3/4" CRSH-2502-3 to sample cooler and drain header (2" DRH-2502-1). b) Use VC inertia @ connections to drain header (new VC spectra).
* From Hx	2" CRBH-2502-2 from HX-E-8-1 to 3" CRBH-2502-4, 3" CRBH-2502-4 to VC Penetration, 1-1/2" CRBH-2502-3, 5 (Reference Drawing 9699-FK-11F, PI-1061)	OK with reanalysis which incorporates 3/4" bleed line flow lines using new YCS ARS and SAMS.
*RC Pump Vents (SP-RCL-1 to 4)	Pump Vents for 4 Loops (Reference Drawing 9699-FP-1E)	OK per current analysis.
*RC Loop Bypass Vents (SP-RCL-5 to 8)	Pump Vents for 4 Loops	OK per current analysis. (Reference Drawing 9699-FP-1E)
*Steam Generator Drains (SP-SG-1 to 4)	Drains for 4 SGs (Reference Drawing 9699-FP-26F)	OK per current analysis.
*Steam Generator Vents (SP-SG-5 to 8)	3/4" VRH-2502-2, 3, 4, and 8 from SG WP to Anchors (Reference Drawings 9699-FP-48D, 48E)	OK per current analysis.

<u>Piping System</u>	<u>Description/Boundaries</u>	<u>Status/Resolution Strategy</u>
*Pressurizer Narrow Range Level (SP-PZR-4)	1/2" diameter from PZR to Transmitter PR-LT-6 (Reference Drawing 9699-FK-11G)	OK per current analysis.
*Pressurizer Pressure (SP-PZR-5)	Line from PZR to Transmitters PR-PT-6 and PR-PT-711 (Reference Drawing 9699-FK-11G)	OK per current analysis.
*Feed and Bleed Hx Vents (SP-FB-3ab)	3/4" VRH-2502-10 from Hx Cross-Connect Piping to Anchor VRH-RH-1 (Reference Drawing 9699-FP-48D)	OK with reanalysis which models in cross-connect piping, and new YCS SAMs and inertia.
*Bleed Line Flow (SP-FB-4)	See "Bleed Line from Hx"	See "Bleed Line from Hx."
*Reactor and Pressurizer Vent	Vent Lines to PZR and Rx Heads	OK per current analysis.
*RC Loop Pressure Instrumentation Tubing (SP-RCL-21ab)	Instrumentation Tubing from SI Tie-Ins to Transmitters SI-PT-1, 2, 3, 4, MC-PT-100, 200, 300 (Reference Drawing 9699-FK-11D, 11E)	Will be analyzed using DC-1, Revision 4, criteria and new YCS SAMs and inertia.
*RC Loop Instrumentation Tubing (SP-RCL-22)	See "RC Loop Instrumentation Tubing" Above	Will be analyzed using DC-1, Revision 4, criteria and new YCS SAMs and inertia.
*LTOP Instrumentation Tubing (SP-RCL-23)	See "RC Loop Instrumentation Tubing"	Will be analyzed using DC-1, Revision 4, criteria and new YCS SAMs and inertia.

Piping Status

<u>Piping System</u>	<u>Description/Boundaries</u>	<u>Status/Resolution Strategy</u>
*Steam Generator Wide Range Level Reference Leg (SP-SG-13 to 16)	Piping from SG to Transmitters, 4 Loops (Reference Drawing 9699-FK-11J)	OK per current analysis.
*Steam Generator Wide Range Level Variable Leg (SP-SG-17 to 20)	Piping from SG to Transmitters, 4 Loops (Reference Drawing 9699-FK-11H)	OK per current analysis.
*Steam Generator Differential Pressure Flow (SP-SG-21abc)	3/4" CRM-2502-13, 14, 15, and 16 from SGs to Transmitters (Reference Drawing 9699-FK-11K)	OK per current analysis.
*Steam Generator Narrow Range Level (SP-SG-22)	SG to Transmitters	Will be analyzed to DC-1, Revision 4, criteria, with new YCS SAMs and inertia.
*Pressurizer Wide Range Level (SP-PZR-3abc)	Line from PZR to Transmitters PR-LT-8, PR-LT-9, and PR-LT-705 (Reference Drawing 9699-FP-38F)	OK per current analysis.

Piping Status

<u>Piping System Strategy</u>	<u>Description/Boundaries</u>	<u>Status/Resolution</u>
*Bleed Piping VC Penetration to LCV-222	Outside VC-VC Penetration to LCV-222	OK per current analysis.
Charging Piping - VC Penetration to Valve Room	Outside VC	Will be analyzed using DC-1, Revision 4, criteria with NRC spectra.
Fire Piping TK-55 Nozzle to Isolation Valve	Outside VC	Will be analyzed using DC-1, Revision 4, criteria with NRC spectra.
Primary Vent Piping - VC Penetration to Valve Room	Outside VC	Will be analyzed using DC-1, Revision 4, criteria with NRC spectra.
Steam Drain Piping - NRV Area to Auxiliary Boiler Room	Outside VC	Will be analyzed using DC-1, Revision 4, criteria with NRC spectra.
Steam Generator Blowdown - VC Penetration to TV-401A, B, C, and D	Outside VC	Will be analyzed using DC-1, Revision 4, criteria with NRC spectra.
Emergency Boiler Feed Blowdown Header to First Check Valve	Outside VC	Will be analyzed using DC-1, Revision 4, criteria with NRC spectra.
Auxiliary Steam Piping NRV Area to TV-406	Outside VC	Will be analyzed using DC-1, Revision 4, criteria.

Piping Status

<u>Piping System</u>	<u>Description/Boundaries</u>	<u>Status/Resolution Strategy</u>
*Make-Up Pump Discharge Piping	New DSSS Piping in SSS Building, PAB, and Buried Piping to PAB	OK per current analysis.
*Make-Up Pump Recirculation Piping	New DSSS Piping in SSS Building	OK per current analysis.
*Make-Up Pump Suction Piping	New DSSS Piping in SSS Building and Buried Piping to Fire Tank	OK per current analysis.
Fuel Oil Piping	Buried Piping from Diesel to Fuel Tank	OK per current analysis.