

Attachment III

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PROJECT NO. 2
DOCKET NO. 50-397
LICENSE NO. CPPR-93
IE CIRCULAR 81-05 SWAY STRUT/SNUBBER END BUSHINGS
10CFR50.55(e) CONDITION #219

Final Report

Description of Deficiency

NRC IE Circular 81-05 addresses potential problems due to loose bushings on strut and snubber paddies. During the Project's evaluation of the Circular it was discovered that inadequate assembly, lack of proper inspection/installation criteria and material substitution may have occurred during installation of struts and snubbers.

Safety Implication

If, due to improper engagement, inadequate assembly or material substitution, a strut or snubber does not function as assumed in piping/support analysis, the piping pressure boundary could fail under overstressed dynamic loads. Although no instances of total disengagement were found, the Project has determined this condition to be reportable under the provisions of 10CFR50.55(e) due to the extensive evaluation and potential rework required to correct existing installations.

Cause of the Deficiency

Inadequate assembly and lack of proper inspection/installation criteria.

Corrective Action

The Architect Engineer (AE) initially contacted each involved vendor requesting a recommended response/resolution to the problems identified in IE Circular 81-05. In addition, a field review of snubbers and sway struts with self-aligning end bushing was conducted to ascertain the extent of the problem at WNP-2. The results are summarized below for both large bore and small bore pipe.

Snubbers

More than 100 snubbers were reviewed, either as-installed or in the warehouse, and it was determined that no bushing disengagement had occurred. The vendor (Pacific Scientific) confirmed that per their bushing staking procedure, no bushing disengagement should occur and due to the clearance between their paddle and clamp or bracket, it was physically not possible to have total disengagement. Further, WNP-2 has installation instructions from Pacific Scientific which helps ensure proper installation of the snubbers. The AE performed a review of all clamps and brackets approved for use with Pacific Scientific snubbers and found the maximum disengagement was within the manufacturer's allowables for all cases except Power Piping M300 series clamps modified to accept extended end bushings. The modified clamps are identified by Power Piping figures M302, Rev. 1, M303, Rev. 1, M304, Rev. 3, and M305, Rev. 1.

PED 215-H-M792 was issued on April 28, 1983 directing the Contractor to inspect and rework, as necessary, all previously installed snubber installations that may have utilized the modified Power Piping M300 series clamps. This PED also revises the Contract Specification (2808-215) to include the same inspection and installation requirements for future snubber installations.

Struts

The AE reviewed approximately 30 installed struts and found partial disengagement did exist, however, no total disengagement was discovered. The vendors involved have indicated that disengagement should not occur if proper staking and installation procedures are followed. However, the vendors stipulated a partial disengagement of up to 33 percent of the bearing surface is tolerable (some vendors indicated a greater disengagement is tolerable; however, 33 percent encompasses all cases).

The AE performed a drawing review to determine the possibility of total bushing disengagement. This effort was complicated as the Engineer allowed interchanging of selected vendor parts during installation. It was discovered that based on possible clearances between the strut paddle and clamp/bracket, it was physically possible to have total disengagement with a limited number of combinations (9 of 500, see Figure 1 attached) of struts and clamps or brackets, if the staking process as performed by the manufacturers was inadequate (as described in IEB 81-05).

To eliminate any possibility of complete disengagement and limit partial disengagement of the sway strut assembly from its paddle end bushing, a Project Engineering Directive (PED 215-H-H197) has been issued directing the Mechanical Contractor to inspect and rework, as necessary, all previously completed rigid sway strut installations. To-date, there are 623 strut assemblies to be inspected. In addition, the contract specification (Contract 215) has been revised by the aforementioned PED to include inspection installation requirements for future installations.

In regard to possible material substitution, an investigation was initiated on the 17 identified potential cases of material substitution on installed components. The concern seems to be based on the visual appearance differences between the pins supplied by PSA and those supplied by Power piping. The PSA pin has a smooth machine finish, smooth ends with chamfers and a mark number, while the pins supplied by Power Piping have saw cut ends, no chamfer and no markings. When comparing the Power Piping pin to the PSA pin, it would be very easy for an individual to assume that unauthorized field made pins had been substituted for the original pin, while in fact, the pin was the original supplied by the manufacturer. The investigation has determined that the pins identified as field made are the original pin supplied by the manufacturer and there is no basis for suspecting that material substitution of pins exists.

Action to Prevent Recurrence

The original installer of sway struts and snubbers, WBG (Contract 215), is no longer a site contractor and the scope of work has been assumed by Bechtel Power Corporation. Bechtel has developed specific work procedures, SWP/P-P-1 and SWP-P-R-10 for the installation and inspection of sway struts and snubbers, respectively. The overall program improvements, other than those instituted as a result of the Reverification Program, are Bechtel review of engineering direction to ensure adequate technical direction is received to perform the scope of work and the development of special work procedures, as necessary.

Additionally, the contract specification for snubbers and sway struts have been revised by PED-215-H-M792 and PED-215-H-197, respectively, to include installation and inspection requirements for future work.

Project Completion of Corrective Action

All required rework will be completed prior to system turnover on a system-by-system basis. In those instances where systems have been turned over, required rework will be completed prior to system operational testing.

FIGURE 1

MATRIX OF POSSIBLE STRUT, CLAMP & BRACKET COMBINATIONS AT WHP-2

PP: Power Piping

G: Grinnell

N: NPSI

STRUT			BRACKET				CLAMP				
Size	PP Old	N	pp* H5142	PP H5146	N	G*	pp* Old	PP New	pp* 400	N	G
#15	X				X		300	300		X	
	X										X
	X										
	X			X				X			
#20/25	X			X				X			
#40		X		X				X			

If strut (X) is combined with clamp/bracket marked (X) total disengagement could occur.

*Bracket and clamp combinations will not result in total disengagement.