From: Mel Shannon
To: Renee Pedersen
Date: 7/28/05 8:40AM
Subject: Re: ACTION: DPO-2005-003 Panel Report

Renee, I wanted to clarify the issue with the stress being applied to both sides of the pipe as follows:

To simplify the issue--assume that a 1000 pound piece of pipe is hanging from a 1 square inch strut. The stress at the strut-pipe attachment would be 1000 psi. Now assume that another strut is attached to the bottom of the pipe and is tightened up until a 1000 pound downward stress is applied to the bottom of the pipe. At this point it would be very clear that the upper strut would now see 2000 psi.

So now we look at the thermal expansion problem. Because the feedwater pipe is heated to higher temperatures than the whip restraint, the pipe expands more than the restraint. for example, this would be the same as tightenin up the bolts 1 turn on each bolt. If the tightening of one bolt results in 50,000 psi loading on one side of the pipe, and tightening of the opposite side bolt applies 50,000 psi to the other side of the pipe, there would be no pipe bending to absorb the stress, won't the two stresses interact to create more than 50,000 psi stress in the pipe and on the whip restraints? The stresses may not double, but won't they create higher stresses than say 50,000 psi?

This is where I do not understand the conclusion reached by the panel that "There is no validity to this concern." Can the panel explain the basis behind their conclusion.

In addition, I previously asked for the initial calculations because I think the licensee performed the calculation wrong for determining the difference in thermal expansion between the pipe and restraint. I believe the following is the correct way to determine the difference in thermal expansion and thus the stress in the restraint:

PIPE---------- 70 - 455 degrees = 385 degrees
7.169E-6 coefficient of thermal expansion

385 X 7.169E-6 = 2760 E-6

RESTRAINT-- 70 - 200 degrees = 130 degrees
5.89E-6 coefficient of thermal expansion

130 X 5.89E-6 = 766 E-6

Subtracting the difference in expansions leaves--

2760 E-6 - 766 E-6 = 1994 E-6

Stresses would be based on stress in the restraint which has a modulus of elasticity of 31.3 E-6 (this value was provided by the panel).

1994 E-6 X 31.3 E+6 = 62,412 psi

This is significantly higher than the value I think was calculated by the panel. I think they calculated the stress at 47,393 psi. I think that this error was the result of following the licensee's improper calculation.

I am not trying to prolong the misery of this issue. My goal is to learn so than I don't make the same mistakes when looking at these types of problems. Feedback on these two parts of the issue would be very helpful. Thanks.