

6) A Portion Of The New Firebox Was Replaced With Flat Plate In A Tight Radius

A sharply radiused portion of the new firebox was cut out and replaced with a piece of flat plate. This is contrary to O.E.M. design and violates railroad standard practice, and NBIC code. PW-9.3.1 states that the “middle lines” of the plate are to be aligned, these are not as one is radiused and the other straight. When replacing a portion of any boiler it is to be replaced “in kind” to the original. This in turn violates CFR49 Part 230.29 (b) (1).

PW-9.3.1 Alignment of Shells and Vessels (Including Pipe or Tube Used as a Shell). In longitudinal shell joints, the middle lines of the adjoining thicknesses shall be in alignment within the fabricating tolerances specified in PW-33.

Alternatively, the middle lines of plates of differing thickness may be offset so that the inside or outside diameters of the thinner and thicker portions of the shell form a continuous surface, provided the following conditions are met:

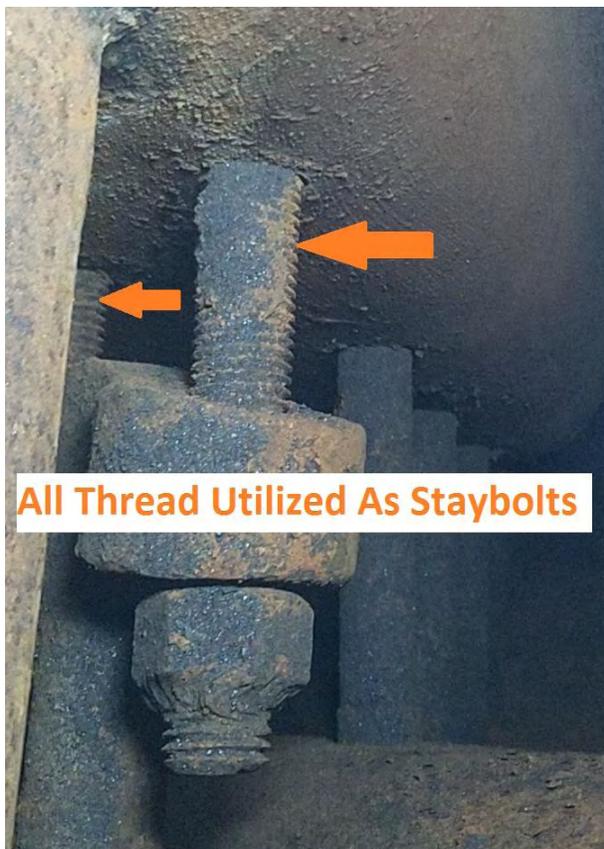
(a) The ratio of the thickness of the thicker plate to the thickness of the thinner plate shall not exceed 2:1.

(b) The maximum design temperature shall not exceed 750°F (400°C).



7) “All Thread” Utilized As Staybolt Material

All of the staybolts between the belly braces and rear tubesheet consist of an “all thread” material. ASME and NBIC specify that acceptable staybolt materials shall comply with SA36 or SA675. Commercially made “all thread” does not comply with either of these material specifications. This style of belly brace is designed to utilize a flexible staybolt, there is a socket beneath the nuts which do not generally contact the brace. This in turn violates CFR49 Part 230.29 (b) (1).



8) “All Thread” Utilized As Studs At 62 Locations Around The Barrel And Firebox, Installed Into Torch Cut Holes

A commercial grade “all thread” material was utilized. There are no commercially available “all thread” materials which are approved for welding into steam boilers. The pieces of “all thread” were installed into torch cut holes. Code does not allow for the welding of threads into a pressure vessel. This in turn violates CFR49 Part 230.29 (b) (1).

PW-5.2 Carbon or alloy steel having a carbon content of more than 0.35% shall not be used in welded construction or be shaped by oxygen cutting or other thermal cutting processes.

Type	Ferritic Steels			
Grade	B7, B7M		B16	
Description	Chromium-Molybdenum [Note (3)]		Chromium-Molybdenum-Vanadium	
	Range	Product Variation, Over or Under [Note (2)]	Range	Product Variation, Over or Under [Note (2)]
Carbon	0.37–0.49 [Note (4)]	0.02	0.36–0.47	0.02
Manganese	0.65–1.10	0.04	0.45–0.70	0.03
Phosphorus, max	0.035	0.005 over	0.035	0.005 over
Sulfur, max	0.040	0.005 over	0.040	0.005 over
Silicon	0.15–0.35	0.02	0.15–0.35	0.02
Chromium	0.75–1.20	0.05	0.80–1.15	0.05
Molybdenum	0.15–0.25	0.02	0.50–0.65	0.03
Vanadium	0.25–0.35	0.03
Aluminum, max % [Note (5)]	0.015	...





There are multiple locations around the pressure vessel at which these incorrectly applied studs are pressure retaining. These are especially concerning because when they do fail there would be a sudden and uncontrolled release of steam. Due to the proximity of the effected attachments to crew or the public, it is almost guaranteed scalding injuries would occur.

9) Bolts Welded Into The Vessel As Studs For Attachment Of Delivery Tee, Bolts Installed Through Torch Cut Holes

The issues with the bolts are no different than those of the studs, the use of bolts is not a compliant practice. The bolts are installed through torch cut holes, leaving behind gouging and striations. As discussed above, PW-29.3 prohibits these physical conditions. The integrity of the reinforcing ring has been compromised. This in turn violates CFR49 Part 230.29 (b) (1).



10) Non-compliant Application Of Nozzles And Scab Patches To Belly Of Barrel

Reinforcing liners for the application of washout plug sleeves were applied via fillet weld after the tubes were installed. Holes were then cut for application of the sleeves (referred to as nozzles), though the nozzles appear to have only been welded to the liner. This is determined via exterior inspection revealing inadequate beveling around the nozzle for full penetration 1 ¼" of material, and a borescope inspection which shows a seam on the waterside of the nozzle.

These conditions are in contradiction to PW-16.1

**PW-16 MINIMUM REQUIREMENTS
FOR ATTACHMENT WELDS**

PW-16.1 General. Except as permitted in PW-16.5 and PW-16.6, nozzles and other connections to shells, drums, and headers shall be attached by full penetration welds applied from one or both sides, partial penetration welds applied from both sides, fillet welds applied from both sides, or fillet and partial penetration welds on opposite sides. In addition to the strength calculations required in



Orange lines show seam between nozzle and boiler barrel. This seam is large enough to show up through the thick layer of debris in the belly.