

mechanical design information, materials of construction and materials properties are to be determined. This information is required for pressure-retaining components in order to identify the most limiting component material that governs brittle fracture. Design information, maintenance/operating history, and information relating to environmental exposure shall be evaluated to determine if there is a risk of brittle fracture. When brittle fracture is a concern, methods to prevent this failure shall be taken. These methods could include changes to operating conditions and further engineering evaluations to be performed by a qualified engineer (metallurgical/corrosion/mechanical). Engineering evaluation methods to prevent brittle fracture shall be reviewed and accepted by the Owner-user, Inspector, and Jurisdiction, as required.”²⁵

There is no indication that Superior Refining Company performed an assessment at any time of the vessel’s susceptibility to brittle fracture. Non-destructive testing by Wet Fluorescent Magnetic Particle (WFMT) was performed in April 2013 on top head/shell welds of the Primary Absorber,²⁶ but this would not have identified brittle fracture issues with the A-212 metal (although this testing did find six linear indications in the welds tested that had to be ground out).

Newly Revised Shutdown Operating Procedure Dated April 25, 2018

As noted above, a revised shutdown procedure for the FCCU and GCU had been issued only a day before this incident. Operators interviewed indicated that since this was the first use of this revision they were not very familiar with the changes and had not been trained to the procedure. In fact, the morning of the incident is when they were first given a copy of the revised procedure and were assigned to perform specific tasks in the procedure.

A few steps in the procedure were likely factors related to this incident.



In fact, based on interviews with (b)(7)(C) on duty the day of the incident, (b)(7)(C) was not aware that spent slide valve differential pressure (D/P) was an important parameter to monitor during the shutdown, and (b)(7)(C) was not closely monitoring this D/P that morning during the shutdown.

²⁵ See the National Board Inspection Code, 2013, Part 2, Inspection, Section 4.4.8.2(a) and (b).

²⁶ See “SUPERIOR004667-SUPERIOR004670 15G-V08 Pri Absorber UTs 2013.”

²⁷ See “SUPERIOR002476-SUPERIOR002495 SOP Shutdown Steam Purge.”

²⁸ See “SUPERIOR001797-SUPERIOR001819 Shutdown Procedures.”

²⁹ (b)(7)(C)