



## U. S. Chemical Safety and Hazard Investigation Board RECOMMENDATION STATUS CHANGE SUMMARY

<b>Report:</b>	Pressure Vessel Explosion at Loy-Lange Box Company
<b>Recommendation Number:</b>	2017-04-I-MO-R7
<b>Date Issued:</b>	July 29, 2022
<b>Recipient:</b>	Arise, Inc.
<b>New Status:</b>	Closed – Acceptable Action
<b>Date of Status Change:</b>	January 17, 2023

### Recommendation Text:

*Update company policies and/or procedures by including prescriptive elements in the boiler and pressure vessel repair and alteration inspection and acceptance process that would prevent the acceptance of a non-conforming repair or alteration.*

### Board Status Change Decision:

#### A. Rationale for Recommendation

On April 3, 2017, an explosion occurred at the Loy-Lange Box Company (Loy-Lange) in St. Louis, Missouri when the bottom head of a pressure vessel (called a Semi-Closed Receiver (SCR)) catastrophically failed. The pressure vessel failure caused a boiling liquid expanding vapor explosion (BLEVE) which fatally injured a Loy-Lange employee working nearby. The pressure vessel then launched from the Loy-Lange building into the air and crashed through the roof of a nearby business, fatally injuring three members of the public.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated the incident and found that the failed pressure vessel resulted from oxygen pitting corrosion and generalized corrosion which thinned the pressure vessel bottom head until it could no longer contain the pressure inside the vessel. The CSB determined that the cause of the incident was deficiencies in Loy-Lange's operations, policies, and process safety practices that failed to prevent or mitigate chronic corrosion in the pressure vessel as well as Kickham Boiler and Engineering, Inc.'s performance of an inadequate repair to the SCR in 2012 that left damaged material in place. A contributing factor was that the inadequate repair was accepted by Arise, Inc.'s repair inspector. As a result of these findings, the CSB issued one recommendation to Arise Inc. This status change summary addresses CSB Recommendation No. 2017-04-I-MO-R7.

#### B. Response to the Recommendation

In October 2022, Arise, Inc. advised the CSB that it had updated its Quality Processes to include additional inspection points to verify repair compliance, as well as the addition of an annual audit by a supervisor to ensure those inspection points are being used for closer repair performance evaluation. Documentation of these improvements was submitted to the CSB for evaluation.

C. Board Analysis and Decision

Based on Arise's response and CSB review of documentation submitted, the requirements of the CSB Recommendation have been met. Therefore, the Board voted to change the status of CSB Recommendation No. 2017-04-I-MO-R7 to: "Closed – Acceptable Action."