



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

Report:	Enterprise Pascagoula Gas Plant Explosion and Fire
Recommendation Number(s):	2016-02-I-MS-R3 2016-02-I-MS-R4
Date Issued:	February 13, 2019
Recipient:	GPA Midstream Association
New Status:	R3: Open – Unacceptable Response/No Response Received R4: Open – Unacceptable Response/No Response Received
Date of Status Change:	September 7, 2019

Recommendation Text:

2016-02-I-MS-R3:

Develop a database for operators to submit BAHX operational data for collaborative industry learning and analysis. Encourage your members to submit pressure and temperature data associated with the entire service life of brazed aluminum heat exchangers as well as the date(s) of leak(s) or failure(s) for each exchanger on which data is being submitted. At a minimum this system should:

- a. provide a way to anonymously input data into the database;*
- b. specify the time interval between measurements such that data can be normalized across different exchangers; and*
- c. capture the type of service in which the exchanger was operating.*

2016-02-I-MS-R4:

Using available operational process data of BAHXs in midstream gas plant operation collected in fulfillment of 2016-02-I-MS-R3, continue data analysis efforts to determine what, if any, correlation exists between operational process data and the frequency or timing of thermal fatigue-generated cracking to more accurately predict the service life of a BAHX.

Should predictors be identified, develop and offer to your members industry tools, techniques, or criteria for estimating when thermal fatigue warrants preemptive replacement of a BAHX (e.g., risk assessment tools or damage rate calculations).

Board Status Change Decision:

A. Rationale for Recommendation

On June 27, 2016, a major loss of containment (LOC) resulted in the release of methane, ethane, propane, and several other hydrocarbons at the Enterprise Products Pascagoula Gas Plant (PGP)

in Pascagoula, Mississippi. The hydrocarbons ignited, initiating a series of fires and explosions, which ultimately shut down the site for almost six months. Two workers were on the night shift when the incident occurred and were uninjured.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) determined that the probable cause of this incident was the failure of a brazed aluminum heat exchanger (BAHX) due to thermal fatigue. The absence of a reliable process to ensure the mechanical integrity of the heat exchanger contributed to the catastrophic failure of the equipment. Given this information, the CSB issued three recommendations to GPA Midstream Association. This status change summary addresses **CSB Recommendation Nos. 2016-02-I-MS-R3** and **2016-02-I-MS-R4**.

B. Response to the Recommendation

In May of 2019, the GPA Midstream Association informed the CSB that they did not intend to implement R3 due to it being very challenging and of limited technical use for the following reasons:

- Several of the GPA Midstream member companies have already begun attempting internal projects on their own similar to this one and eventually realized that the amount of data that would be collected would overwhelm their internal resources for storage and analysis. Since a centralized database at GPA Midstream would be comprised of contributions from all its members, the natural conclusion is that any system that GPA Midstream would develop would be similarly challenged.
- Some members may have concerns in providing this data outside of their own organization.
- As a part of Project 184 (previously described), the University of Houston collected such data and, at the end of the project, was unable to make any correlation between the data provided and failures. Member company representatives who participated in the review of these proposed recommendations believe that many factors can influence the validity and usability of such a database, including:
 - the wide variety of BAHX configurations throughout the industry's fleet,
 - differences in existing placement of process monitoring sensors from facility to facility,
 - the diversity of the chemical constituents that make up the process streams entering these units,
 - the lack of measured critical process information in some cases and
 - variation of fabrication quality and manufacturing anomalies
 - other process and operational challenges

As such, the archived data would not allow for an "apples to apples" comparison to be possible and, similarly to Project 184, it is believed that no useful correlations regarding the forecasting of expected equipment life limits due to thermal fatigue would be possible.

- Given that thermal fatigue is by nature an accumulative effect, a true history of the various thermal stresses BAHXs have been exposed to would be required to adequately characterize its contribution to the mechanical integrity of any unit at any particular time. This suggests that the record needs to begin with a new unit and be tracked during the

duration of its life. Many of the BAHXs currently in use have been in service for many years and this earlier data does not exist, resulting in an incomplete history that would compromise the validity of analysis performed.

They do not intend to implement R4, because R4 relies on the completion of R3 in order to implement it.

C. Board Analysis and Decision

As the GPA Midstream Association confirmed its intentions not to implement the CSB Recommendations and that the CSB believes there is still time to advocate for their implementation, the Board voted to change the statuses of **Recommendations No. 2016-02-I-MS-R3** and **No. 2016-02-I-MS-R4** to: “**Open - Unacceptable Response/No Response Received.**”