Industrial Articles Presented in International Conference on Process Engineering and Advanced Materials (ICPEAM2020), 13-15 July 2021

MAXIMISE PRODUCTION VIA DCS LEVEL CONTROL SCHEME

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ABSTRACT

In PETRONAS LNG Complex, the Acid Gas Removal Unit (AGRU) stability is crucial to ensure maximisation of LNG production. Foaming in Absorber Column, C-91101 is a commonly encountered problem in MLNG TIGA LNG Trains. Severe foaming incident results in liquid carry-over to the downstream unit and cause total LNG Train trip as per safeguarding. As a countermeasure, a new control scheme residing at the DCS level was specially designed and commissioned in both Train 7 & 8. This is an integrated initiative between Advanced Process Control (APC), Technologist, and Operation team to support production maximisation and sustenance. Operated with 100% uptime, this control scheme ensures standardized action to be taken and provides overall dynamic stability at AGRU, allowing for production maximisation without jeopardizing the absorber column's tray integrity. This initiative leads to LNG Big Cargo Equivalent (BCE) loss reduction from 0.9 BCE (2015) to an average of 0.09 BCE (2016 – 2019), which is equivalent to a 90% improvement.

Keywords: *Advanced Process Control (APC), DCS, DCS Level Control Scheme, Foaming, Liquefied Natural Gas (LNG)*

INTRODUCTION

MLNG TIGA consists of 2 LNG trains, Train 7 and 8. MLNG TIGA DCS Level Control Scheme was fully commissioned in November 2015 and February 2016 for Train 8 and 7, respectively. This project was an integrated initiative between Advanced Process Control (APC), Technologist, and Operation team to reduce Foaming in the Absorber column and ensure overall Acid Gas Removal Unit (AGRU) stability.

Problem Statement

Foaming in Absorber Column, C-91101 is a commonly encountered problem in MLNG TIGA LNG Trains. The foaming solvent considerably reduces the hydraulic and hence the treating capacity of the absorber column. Severe carry-over of solvent in the absorber column results in liquid carry-over to downstream Drier unit and cause total LNG Train trip as per safeguarding.

Scope & Objective

To cater to this issue, a DCS Level Control Scheme was introduced to reduce absorber column process instability by reacting to foaming incidents by stabilising the AGRU process without jeopardizing the absorber column's tray integrity.

Literature

The DCS Level Control Scheme detects foaming incidents and stabilise the column to prevent potential solvent carry over to the downstream unit and production loss.

Overview of Results

After implementing this DCS Level Control Scheme, Acid Gas Removal Unit (AGRU) stabilised, leading to sustainable production and pushing the process towards the constraint. Hence, enable LNG (BCE) loss reduction from 0.9 BCE (2015) to average 0.09 BCE (2016 – 2019) which is equivalent to 90% improvement.

METHODOLOGY

Old Mitigation Action

Once a Foaming incident is suspected to occur, Panel Operator (PO) will inject Anti-Foam into the absorber

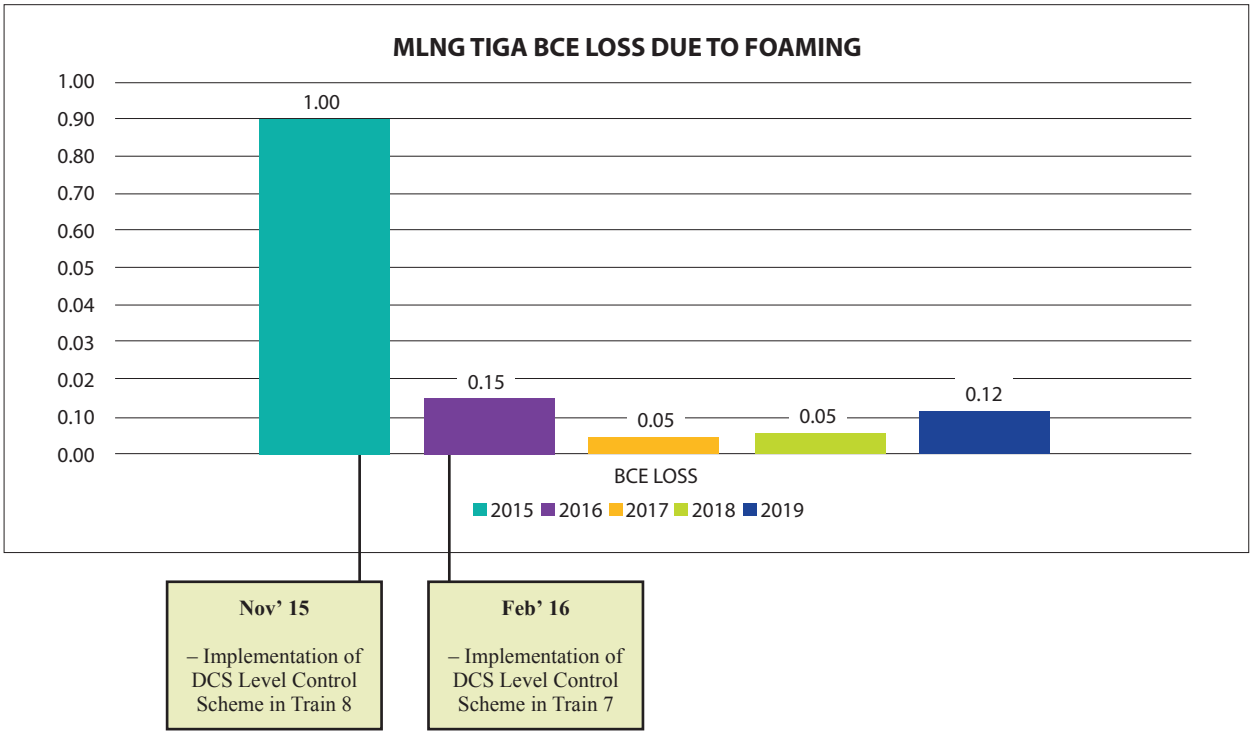

Figure 1 BCE Loss Comparison

column. If Foaming is observed to be severe, PO needs to stabilise the AGRU process quickly. The disadvantage of this mitigation action was each PO has a different rhythm to stabilise the process and eventually leads to non-standardisation. If mitigation actions are too slow, solvent carries over to the downstream unit, leading to a total LNG train trip.

New Mitigation Action

Early detection of Foaming with the right time and standardization of mitigation actions to manage Foaming eventually minimise LNG (BCE) loss.

RESULT AND DISCUSSION

Before implementing this DCS Level Control Scheme, MLNG TIGA LNG Trains experienced 0.9 BCE loss due to foaming incident and total LNG Train trip. After implementation, LNG production loss reduced to an average of 0.09 BCE, hence enable production maximisation opportunity.

Tangible Benefit

Figure 1 shows BCE loss comparison before and after implementation of the DCS Level Control Scheme. This process control improvement has realised the economic benefits of LNG BCE loss reduction from 0.9 BCE (2015) to an average of 0.09 BCE (2016 – 2019), equivalent to a 90% improvement. Detail calculation of economic benefit is shown as below,

YEAR	2015	2016	2017	2018	2019
BCE LOSS	0.90	0.15	0.05	0.05	0.12

Average BCE Loss (2016 – 2019) = (0.15 + 0.05 + 0.05 + 0.12)/4
= **0.09 BCE**

BCE Loss Improvement = [(0.9 – 0.09)/0.9] * 100
= **90%**

CONCLUSION

In conclusion, DCS Level Control Scheme can support dynamic process stability, providing stability and eventually production maximisation.

REFERENCES

B. Thitakamol, A. Veawab, & A. Aroonwilas, "Foaming in amine-based CO_2 capture process: Experiment, modeling and simulation", *Energy Procedia*, 1, pp. 381-1386, 2009, doi: 10.1016/j.egypro.2009.01.181.