

Title: ULP Gasket Rupture

Reference: REX-MS-AFA-2021-007

Date : 14 October 2021

Business: Logistics

Country: South Africa

Site: Island View Terminal

Domains : ☒ Workplace safety ☒ Technological risk ☐ Transport ☐ Health ☐ Environment ☐ Security ☐ Societal

Causes key words: Management of Change, Isolation, Thermal Expansion

Consequences key words: Loss of containment, HIPO



Incident description:

On 14/10/2021, a vapour detector alarm was triggered at the multi product pipeline pump farm at 12:31pm. On investigation it was discovered that a gasket had ruptured on a flange of the ULP 95 inlet line to Tank 642 resulting in a loss of containment of 900lt. The site responded by in line with their emergency response plans with no deviation noted.

The site was in the process of receiving tank 642 back into operations after maintenance. As part of the handover, the meters were required to be calibrated. In order to calibrate the meters at the gantry, the tank was filled, and product was allowed back into the line to feed back to the gantry. During the meter calibration, the engineers and site management had identified that the pumps were not operating smoothly. The decision was taken to delay the handover of Tank 642 until the pump maintenance had been completed. The site then closed the valves to both ULP pumps, on both the inlet to the tanks and outlet to the pumps to ensure that they were not used. All the valves, including a maintenance valve on the inlet line were closed.

The valves had been closed from the 3rd September until the gasket rupture took place on the 14 October 2021. The immediate causes for the gasket failure at a flange was due to the inability to relieve pressure back to Tank 432. The maintenance valve located in the T644 bund was closed and it was this valve that stopped the relief of pressure in the line back to the tank.

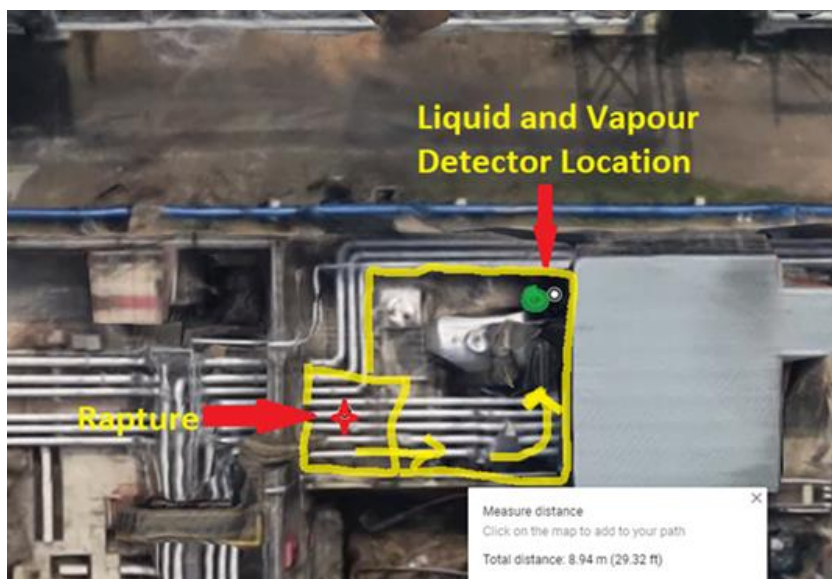


Image 1: Location of the ruptured gasket and vapour detector

Consequences: Loss of containment

Physical: None

Material or production-related: 900lt Loss of ULP into the bunded area

Environmental: None

Media-related: None

Analysis:

The depot valves are being operated without the risk identification & control. The valve management procedure CR-PROC-TAFS -SL-1043 require the safe and efficient management of valves at the terminal. Valves should be identified in the facility, a valve register created, understand, and define the function of all the valves, create the rules for the manipulation of all the valves and define the methods to lock/seal the valves. However, at the depot, they were still in the process of identifying the valves at the time of the incident.

Tank 642 was modified and returned to service without full MOC compliance which requires a Pre-start safety review conducted by a team (Depot Operations, HSSE & Project team) and training of personnel on the newly modified system. Changes to the operational plans were not adequately managed in line with the decision to isolate the manifold that was charged with ULP product while evaluating the extension of the pump commissioning.

The pre-start up safety review was conducted by the Contractor and the Project Engineer only. There was no Depot representative during the PSSR as per MOC procedure requirement.

Improvement on the depot employees risk understanding and management must be considered specifically related to thermal expansion. The depot specifically has a complicated network of pipelines which must be well understood by operational staff to ensure adequate risk identification is possible. Management were trained on Works on Tanks & Isolation training but there was inadequate training retention.

Immediate causes:

Deviation by group:

- Operational control of the Depot, the valves were closed on the 3/09/21 and the site did not revisit & reassess the valves in line with the thermal risk associated with the valves being closed.

Deviation & improper decision making by Supervisor, The Terminal Supervisor delegated the action of valve manipulation to the plant assistant without assessing the risk. Protective systems:

- Inadequate thermal risk control, valves are not equipped with TRV's and lines were not drained when isolated. This means that when product expands due to the High temperature of day, there was no possibility to relieve the pressure on the line, leading to the gasket rupture.

Root causes:

Inadequate Management of change & Inadequate risk identification:

- Assessing the risk when a change was required on site i.e. pump breakdown and isolation of valves. When moving from Operation to maintenance position. The Depot did not identify the need for formal isolation and did not identify the thermal pressure build-up in the piping with ULP.

Inadequate control :

- Inadequate isolation – the isolation procedure was not implemented.
- Commissioning of the system without MOC and SOP/WI development and training of personnel on the system.
- Poor work methods MOC not signed off by the Depot Manager, Pre-start up safety review not completed by the requires team as per MOC procedure.

Inadequate training :

- Terminal Supervisor & Terminal Manager had not yet completed isolation training at the time the isolation was in place.

Inadequate Learning from events :



TotalEnergies

HSE Return on experience

- Learnings from previous gasket rupture event & isolation leak event were not applied. The corrective actions from the previous event required more time for implementation, however , interim immediate preventative measures should have been identified.

Standards or good practices:

CR-GR-HSE-428 HSE Requirements for the Isolation of Powered Systems
CR-PROC-TAFS-HSEQ-1123 Isolation procedure
CR-GR-HSE-302 Management of Change
CR-PROC-TAFS-HSEQ-889 Change Management
CR-PROC-TAFS-SL- Valve Management Procedure

Recommendations:

- All critical valves must be identified and locked in the normal position and assess the possibility for relief should they be closed.
- Any manipulation of non-process valves must follow the isolation procedure
- Any valve manipulation should be critically evaluated to determine if there is a possible risk
- Sites should identify if there are any operational valves that may cause thermal pressure to build up without sufficient relief in the system.
- Plant monitoring inspections should be completed in a disciplined manner and anomalies investigated thoroughly and reported appropriately.
- MOC close out requirements should be monitored and adhered to (PSSR to be conducted by all relevant team, SOP/WI updates and training of personnel prior to commissioning of the changed system).
- Personnel required to manipulate or operate the system, regardless of whether it is during normal operations or during works, should be trained and declared competent on the system and on Isolation procedures.