

# Lessons Learned

## Process safety Event Tier 1 and reportable incident



### Incident:

**Functional failure of a high-pressure hose containing hydraulic oil resulted in a fire in the hydraulic power unit and caused a shelter in place in neighbor city of La Porte.**

**What:** Fire in the hydraulic unit

**When:** 11<sup>th</sup> December 2020

**Where:** Houston Terminal, US

### Summary:

On Friday, December 11, 2020, a fire ignited at approximately 5:26 pm in the power pack room in the utilities area at the Odfjell Terminals US (OTUS) Houston terminal. The fire was fully extinguished within three hours. This resulted in a loss of 70% of pump operation and business capabilities and up to USD 27 million in property and business interruption damages

### Why did this happen?

The combustion and ignition properties of the hydraulic oil indicate that it was released as a spray or mist to enable ignition to occur. A release from the high-pressure portion of the system (hydraulic oil discharge from the pumps) could generate an ignitable spray or mist. It appears an electric motor was the source of ignition

### What went well?

- Rapid emergency response and fire fighting
- Recovered full operations within 41 days

### Related essentials / Directives / Procedures:

- Material and maintenance
- Design and construction
- Instrumentation
- Mist detection and ignition prevention
- Fire protection and suppression
- Unidentified risk

### Lesson learned and follow-up for each site

- Provide fire detection with alarms and suppression systems tied to the ventilation system and the pump ESD system as well. Continue working with Odfjell Tanker organization and industry specialists to identify the best technologies for the detection of oily mist and fire in the HPU building, adjust the plan as improved technologies are discovered
- Improved instrumentation and controls to locally and remotely (in the control room) monitor and safeguard the new HPU operation

- All hoses used to connect the high-pressure pump discharge to the "pressure distribution block" and high-pressure supply header will be constructed from SAE Code 62 rated components (nominally 6,000 psi). They will be fabricated/tested per Odfjell Terminal specifications for high-pressure hydraulic supply hoses
- All low-pressure relief, flush and return hoses will be constructed from SAE Code 61 rated components (nominally 3,000 psi); these will be fabricated/tested per Odfjell Terminal specifications for low-pressure hydraulic return hoses
- Annual replacement program of the HPU hoses
- Sufficient reservoir size and design for improved residence time. Increasing reservoir size allows for reduced hydraulic oil temperature (high oil temperatures can cause varnish). Additionally, increasing reservoir size could reduce micro-bubbles in the hydraulic oil, which can create cavitation
- All pumps will have dedicated suction pipe headers from the reservoir. This will ensure that each high-pressure hydraulic pump is not fighting for NPSH from a common header, which could contribute to pump cavitation
- High Motor Temperatures: motor winding RTDs will provide alarm of abnormal motor loads from potential pump issues/failures
- Pump and motor vibration monitoring to directly monitor pump and motor vibration on HPU
- Full visibility of the system and new HPU building from the control room

*Note: Excerpt of OTUS Corporate Memo submitted on May 19<sup>th</sup>, 2021. Engineering design is still underway for the new HPU which may enhance/complement some corrective actions.*

### For further information please contact:

John Blanchard, CEO OTUS [John.Blanchard@odfjell.com](mailto:John.Blanchard@odfjell.com)

Or

Christophe Mediavilla, Operational Excellence Manager

[Christophe.mediavilla@odfjell.com](mailto:Christophe.mediavilla@odfjell.com)

