

Accident Profile

Title

Release of crack gas in Ethylene production unit

Date/Time of Major Occurrence

Start Date 03-09-2006

End Date 03-09-2006

Accident Type

Major Accident

Reported under

EU Seveso II Directive

Seveso II Status

Upper tier

Industrial Activity

Plastic and rubber manufacture

Reasons for Reporting

Substances involved: greater than 5% of quantity in Column 3 of Annex I

Injury to persons: >= 1 fatalities, >= 6 hospitalizing injuries, evacuation, shelter-in-place, utility disruption and damage to real estate

Immediate damage to the environment (according to Annex VI)

Damage to property: on-site >2M €; off-site > 0.5M €;

Cross-border damage: transboundary accidents

Interesting for lessons learned.

Accident Report

Accident description

Release of crack gas in Ethylene production unit, emission of approx. 3500 kg C1-C5, main component propylene.

Accident involving

☐ Domino effects

☐ Natech events

☐ Transboundary effects

☐ Contractors

Release

Major Occurrences

gas/vapour/mist/etc release to air

Site and installation

Site description

not given

Installation/Unit description

The leakage occurred directly after cleaning of a strainer in the 5th phase of crack gas compression in the Ethylene unit. Failure of one or more bolts of the lid on the down side of a strainer resulted in loosening of the lid. The gas escaped (38,5 barg, 20 C). The release was immediately detected, causing a plant shut-down. The incident had only an environmental effect. A fire/explosion was possible, with potentially domino effects.

Substances

Substances Involved

Crack gas:
H₂/CH₄ 7,5 mol%
C₂ 22,5%
C₃ 28,0%
C₄ 17,0%
C₅+ 25%

Quantity lost: ca 3500 kg

Substances Classification

08. EXTREMELY FLAMMABLE - note 3(c)

Substances detail

Substance	CAS Number	Quantities (t.)	
		Involved	Potential

Causes

The strainer was inappropriately used as a filter and had to be cleaned on a fairly regular basis. This was done by removing the lid on the down-side of the strainer and 'cleaning' the filter in the strainer. Afterwards the lid has to be replaced.

Causes:

- inappropriate use of bolts. Some of them were heavily corroded and damaged and not fit for this particular use (different length and type of wire)
- expertise of operators of the production section who performed the maintenance was inadequate. No clear references for the quality of the bolts were available.
- supervision of the quality of first line maintenance is inadequate
- no procedure or instruction for the cleaning operation
- production organisation was not adequately aware of the risks involved with this kind of action
- use of a strainer as a process filter is not appropriate. The strainer had to be cleaned on a weekly or even daily basis. This risk was not identified, neither in the design nor in the repair phase.
- it could not be ascertained that a risk study has been performed before placing the strainer in 94/95 as would be required by the MOC (management of change).

Plant/Equipment

Causative Factor	Type
component/machinery failure/malfunction	

Other

Yes

Consequences

Only release. No fire, explosion (though it could have happened) or injuries. 3500 kg C₁-C₅ which was

emitted has obviously had some effect on the atmosphere. Beside the production loss due to shut down, there has been no material loss.

Cost

On site	Quantity	Quantity/Effect
material losses		production losses

Emergency Response

The installation was taken out of operation immediately after detection. Operations and (company) fire brigade have blocked several valves, stopping the leakage. Actions of company fire brigade and available equipment was effective. Sprinklers automatically activated and the fire brigade used a water gun to mix the vapour-fluid mixture. Drains were filled with foam to block gas release.

Emergency Response	Quantity	Quantity/Effect
On-site systems		fire services; drench systems; foam
Off-site external services		
Sheltering		
Evacuation		
Other		

Remedial Measure	Quantity	Quantity/Effect
Decontamination		
Restoration		
Other		

Lessons Learned

Theme of the Lessons Learned

Causes - Plant/Equipment
Causes - Organisational

Lessons Learned

Immediate lessons learned - Description:

- don't use strainers as a filter in this situation
- improve expertise on first-line maintenance and availability of references for operators.

Event Profile

Publication Date