Accident Profile

Title

Explosion and fire of the desulphurisation unit of the distilled intermediate

Date/Time of Major Occurrence

Start Date 12-10-2002 **End Date** 13-10-2002

Accident Type

Major Accident

Reported under

EU Seveso II Directive

Seveso II Status

Upper tier

Industrial Activity

Petrochemical / Oil Refineries

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

The initial gravity of the event gives rise to the activation of the External Emergency Plan. There was an explosion followed by a fire in the process area.

Accident involving

☐ Domino effects ☐ Natech events ☐ Transboundary effects ☐ Contractors

Fire

Major Occurences

pool fire (burning pool of liquid, contained or uncontained)

jet flame (burning jet of fluid from orifice)

Explosion

Initiating Events

pressure burst (rupture of pressure system)

Site and installation

Site description

Oil refining industry.

Installation/Unit description

It occurred in Unit G of the desulphurisation of the distilled intermediate. This unit is in the Zone of Process 1.

Storage

Major occurrences	Equipment Type
process-associated (stockholding, etc. on-site of manufacture)	free placement (unconfined pile, stack,etc; if bagged or in cylinders, ...)

Process

Major occurrences	Equipment Type
chemical continuous reaction	reaction vessel; pressurised

Initiating Events	Equipment Type
chemical continuous reaction	reaction vessel; pressurised

Substances

Substances Involved

Intermediate petroleum distillate. Hydrogen (C.A.S. No: 133-74-0).

Kerosene total inventory 800,000 tonnes, gas oil (medium distillate) - 70 m3 directly and indirectly involved; hydrogen 200 Nm3 directly and indirectly involved hydrogen and gas oil were directly involved in the originating event

Substances Classification

02. TOXIC
04. EXPLOSIVE - note 2(a)
06. FLAMMABLE - note 3(a)
07 a. HIGHLY FLAMMABLE - note 3(b)(1)
08. EXTREMELY FLAMMABLE - note 3(c)
00. NAMED SUBSTANCE

Substances detail

Substance	CAS Number	Quantities (t.)	
		Involved	Potential
02. TOXIC			
ammonium nitrate	6484-52-2		
ammonium nitrate fertilisers		15372.00000	17100.00000
01. VERY TOXIC			
butane[1], isobutane [2] (liquefied extremely flammable gas)	00106-97-8; 00075-28		
propane (liquefied extremely flammable gas)	00074-98-6		
automotive petrol and other petroleum spirits	08002-05-9		
07 a. HIGHLY FLAMMABLE - note 3(b)(1)			
methanol	00067-56-1		
propene; propylene (liquefied extremely flammable gas)	00115-07-1		
automotive petrol and other petroleum spirits	08002-05-9		
hydrogen	01333-74-0		
06. FLAMMABLE - note 3(a)			

Causes

Leakage of distilled petroleum intermediate and hydrogen. Explosion and later fire of both substances, in the form of a pool fire and a jet flame from a pipe.

Organizational

Causative Factor	Type
management organization inadequate	none
management attitude problem	none
organized procedures	none

design of plant/equipment/system	none

Plant/Equipment

Causative Factor	Type
vessel/container/containment-equipment failure	none
unexpected reaction/phase-transition	none

Consequences

Loss of materials in the affected zone of process.

Upheavals to the neighbouring municipality: uncertainty, confinement in closed spaces, traffic interruptions.

Affected Area: installation
Affected Area: establishment

Human

On site	Quantity	Quantity/Effect
At risk		Establishment Population: 10

Off site	Quantity	Quantity/Effect
At risk		Emergency Personnel : 30

Cost

On site	Quantity	Quantity/Effect
material losses		Loss of materials in the affected zone of process

Disruption

Off site	Quantity	Quantity/Effect
infrastructure (telecommunication, roads, railways, waterways, air transport etc		
other		Upheavals to the neighbouring municipality: uncertainty, confinement in closed spaces, traffic interruptions.

Emergency Response

On-site: emergency shut-off valve, injection of nitrogen, refrigeration with water from the nearest installation, control and later suppression of the fire.

External: interruption of adjacent highways, confinement order on the neighbouring population, approach of ambulances to the waiting points, environmental evaluation.

Official action taken - other official action: An official investigation was made into the causes of the accident. The results of the investigation were used for this report. Verification of all modifications, maintenance operations, construction works and inspections performed on the installation involved in the accident.

Discussion about response: Technicians from the public health service took measurements for toxic agents with negative results; these results were used to evaluate the potential effects on the population.

Emergency Response	Quantity	Quantity/Effect
On-site systems		
Off-site external services		external fire-fighting services; external ambulance/victim-recovery services; police intervention; traffic control;
Sheltering		public alerted directly by emergency services; public alerted via media
Evacuation		
Other		environmental monitoring

Remedial Measure	Quantity	Quantity/Effect
Decontamination		
Restoration		
Other		

Lessons Learned

Theme of the Lessons Learned

Causes - Plant/Equipment

Emergency Response

Lessons Learned

Location of dynamic forward command posts; that is, as a function based on the gravity or the consequences of the accident.

Improvement of the communication between PMA and the Crisis Unit, by assigning Civil Protection staff to the Crisis Unit.

Warning of the Delegation of Government not followed because of a misunderstanding that the warning was already with the Management Committee

Measures to prevent recurrence: Modify the design of the manifold

Useful references: The flow modelling software FLUENT was used to model the flow inside the pipe that ruptured and explain the erosion inside the pipe.

Event Profile

Publication Date 06/12/19