

Incident Title		Absorber/Stripper Reflux Cooler Bypass Rupture	
Incident Type		Fire and Explosion	
Date		9 th November 1992	
Country		France	
Location		La Mède	
Fatalities		Injuries	Cost
6		38 (1 serious)	US\$ 575 m (2021) – Ref. 2
Incident Description		<p>On 09-Nov-92 with the Fluid Catalytic Cracker Unit (FCCU) running normally, a DN 200 (8" NS) bypass line around the Unsaturated Gas Plant (USGP) absorber/stripper reflux cooler suddenly ruptured. Approximately 12 tonnes (26,500 lbs) of light hydrocarbons were released over a 10-minute period, creating a vapour cloud covering an area of around 14,000 m² (150,000 ft²) and engulfing several process units. The cloud reached a fired heater and exploded. The resulting overpressure caused massive damage to the FCCU and USGP and the roof of the local control room collapsed, killing 3 of its occupants. A massive fire caused further loss of containment and escalation. The refinery fire brigade and over 100 external firefighters from neighbouring industrial sites and towns took 6 hours to extinguish or bring most of the fires under control but some were left burning to allow safe depressurisation of the process units because the flare system had suffered explosion damage. The whole refinery was shut down for several months and the FCC and the USGP took a year to rebuild. A nearby town also suffered property damage.</p>	
 <p>Credit: Ministry of Environment/BARPI</p>			
Incident Analysis		<p>Basic cause was rupture of the carbon steel absorber/stripper reflux cooler bypass line due to uniform internal corrosion which led to a loss of primary containment (LOPC) and a vapour cloud explosion (VCE).</p> <p>Critical factors included: 1) The local control room (built in 1953) had not been designed to be blast-resistant, 2) Proximity of occupied buildings (e.g. local control room) and other process equipment (e.g. tanks) to the epicentre of the explosion, 3) The failed pipe was original equipment (started up in 1956) and had not been regularly inspected because it was a bypass line.</p> <p>Root causes included: 1) Poor plant layout and inadequate equipment spacing (occupied buildings and storage tanks too close to FCC/USGP), 2) Inadequate process hazard analysis (impact of fire and blast wave exposure on adjacent process plant), 3) Inadequate hazard awareness (corrosion in dead-legs), 4) Inadequate inspection (corrosion monitoring), 5) Inadequate process safety management (absence of engineering authority role).</p>	
Lessons Learned		<p>1) Occupied buildings should be sited outside areas where thermal effects or overpressure could cause significant damage to the building and/or should be constructed to be sufficiently blast-resistant to mitigate any material risk.</p> <p>2) Worst case scenario studies (including escalation) should be carried out to inform plant design (e.g. plant layout, equipment spacing, active/passive fire protection, etc) and emergency response planning strategies.</p> <p>3) Robust management of change (MoC) criteria should be applied to any proposal to site new/modified equipment near large potential sources of leak.</p> <p>4) Process units and piping systems should be systematically reviewed and field-checked to identify and (where practicable) eliminate dead-legs.</p> <p>5) Piping in dead-legs which cannot be eliminated and piping fabricated to superseded material specifications should be subject to enhanced inspection.</p>	
More Information		<p>1) "Gas Explosion in the Cat Cracking and Gas Plant Units of a Refinery" - ARIA 3969 (2008). https://www.aria.developpement-durable.gouv.fr/wp-content/files_mf/FD_3969_La_Mede_1992_ang.pdf.</p> <p>2) "100 Largest Losses in the Hydrocarbon Industry", Marsh Property Risk Consulting Practice, 27th Edition (2022).</p> <p>3) "Integrity Management: Learning from Past Major Industrial Incidents", F. Gil and J. Atherton, BP Process Safety Booklet #14, 2nd Edition (2006).</p>	
Industry Sector		Process Type	Incident Type
Oil & Gas		Fluid Catalytic Cracking	Fire & Explosion
Equipment Category		Equipment Class	Equipment Type
Mechanical		Piping	Pipe