



Oil, Petrochemical and Energy Risks Association

Supporting Learning from Experience

for 40 Years: 1979-2019



Cause of Loss Key:



Design & Construction



Natural Perils



Process Safety Management



Asset Integrity



Unknown

Energy Industry
'Associated/Non-Energy Industry'

January 1979

Bantry Bay

Republic of Ireland

Facility: Terminal (Per'm Products)

Event: Fire
aka 'Betelgeuse' incident



November 1984

Mexico City Mexico

Facility: Terminal (LPC)

Event: BLEVE

Development of World Bank hazard program WHAZAN. Cause of incident inconclusive

December 1984

Bhopal India

Facility: Petrochemicals

Event: Runaway Reaction

World's worst human impact industrial incident.



November 1986

Basel Switzerland

Facility: Petrochemical

Event: Warehouse Fire

Ecological disaster as entire Rhine was polluted with 30 tonnes of pesticides after a fire.



March 1987

Herald of Free

Enterprise

North Sea

Facility:

Passenger Ferry

Event: Capsize

193 lives lost - failure to learn from previous industry near misses



July 1988

Piper Alpha

North Sea

Facility: Offshore Production Platform

Event: Explosion

Cullen Report - Safety Case Regime

167 lives lost.



March 1979

Three Mile Island

USA

Facility: Power Station (Nuclear)

Event:

Runaway Reaction

Hiatus in US nuclear development



March 1980

Alexander Kielland

North Sea

Facility:

Semi-sub Drilling Rig

Event: Capsize

Total Loss - 123 lives lost following fatigue crack in bracing



January 1986

Challenger

SS, USA

Facility: Space Shuttle

Event:

Explosion

O rings in field joints between fuel segment not tested in extreme cold



April 1986

Chernobyl

USSR (Ukraine)

Facility: Power Station (Nuclear)

Event:

Runaway Reaction

End of secrecy in USSR nuclear power - reactor design fundamentally flawed



March 1987

Grangemouth

Scotland

Facility: Refinery

Event: Explosion

Vessel Rupture



October 1989

Pasadena USA

Facility: Petrochemicals

Event: Explosion
Prompted PSM concept in USA, Mary Kay O'Connor Center



July 1994

Milford Haven
Wales

Facility: Refinery
Event: Explosion
Focused attention on 'Alarm Flood'



August 1999

Korfez Turkey

Facility: Tank Farm

Event: Earthquake
Widespread refinery damage from earthquake



June 2000

Mina Al-Ahmadi
Kuwait

Facility: Refinery
Event: Explosion
Importance of 'offsites' corrosion monitoring



March 2001

P-36
Roncador Field

Facility: Semi-sub Production Platform

Event: Explosion
Capsized - compromised modification



March 2005

Texas City USA

Facility: Refinery
Event: Explosion
Baker Report - PSM re-think

December 2005

Buncefield UK

Facility: Terminal (Pet'm Products)
Event: Explosion
VCE in tank farm, prompting changes to tank farm regulation prompting changes to UK regulations



March 1989

Exxon Valdez
Prince William Sound

Facility: Oil Tanker
Event: Grounding
258,000 bbls spilled



April 1992

Guadalajara
Mexico

Facility: Pipeline
Event: Explosion
206 fatalities after gasoline leaked into a sewer system over a number of days



December 1997

Bintulu
Malaysia

Facility: ASU
Event: Explosion
Excessive particulates in air due to deforestation



September 1998

Longford
Australia

Facility: Gas Plant
Event: Explosion
Led to Safety Case culture being adopted in the State of Victoria.



September 2001

Toulouse France

Facility: Fertiliser Plant
Event: Explosion
Changes to fertiliser storage guidance - EFMA



January 2004

Skikda Algeria

Facility: LNG Liquefaction
Event: Explosion
Landmark LNG plant VCE



July 2005

Mumbai High
India

Facility: Offshore Production Platform
Event: Explosion
Riser failure from supply boat impact leading to platform loss



August 2009

Montara Timor Sea

Facility: Offshore Production Platform

Event: Blowout
Example of combined platform and MODU loss, with multiple relief well attempts



February 2011

Gryphon Alpha North Sea

Facility: FPSO
Event: Drift-Off

Example of extensive sub-sea damage and extended LOPI after catastrophic mooring failure



March 2011

Fukushima Japan

Facility: Power Plant (Nuclear)

Event: Tsunami
Tsunami led to utility failure and reactor meltdown



April 2013

La Plata Argentina

Facility: Refinery

Event: Fire
Example of major refinery damage arising from flooding



July 2013

Lac-Mégantic Canada

Facility: Rail Transport

Event: Fire
Multiple fatalities after crude oil train derailment in town



January 2017

Ruwais UAE

Facility: Refinery

Event: Explosion



October 2018

Yanbu KSA

Facility: Petrochemicals

Event: Explosion
Vessel rupture following single barrier failure



April 2018

Ituango Colombia

Facility: Hydro Electric Dam

Event: Collapse
Tunnel collapse



June 2008

Varanus Island Australia

Facility: Gas Plant

Event: Explosion
Escalating pipeline rupture



April 2010

Macondo Gulf of Mexico

Facility: Semi-sub Drilling Rig

Event: Blowout
Extended drilling moratorium and prompted drilling community to embrace PSM



December 2011

Kolskaya Sea of Okhotsk

Facility: MODU

Event: Capsize
Multiple loss of life during 'out of season' MODU tow



December 2012

Kulluk Sitkalidak Island

Facility: Semi-sub Drilling Rig

Event: Grounding
Loss of Arctic type drilling rig during tow



June 2013

Geismar USA

Facility: Petrochemicals

Event: Explosion



August 2015

Tianjin China

Facility: Chemicals Storage

Event: Explosion
80 m crater - Chinese industry moves to regulate industrial safety



March 2019

Yancheng China

Facility: Petrochemicals inc Nitrobenzene

Event: Explosion
Under investigation - 120 m crater





**OPERA is very grateful to the contribution of
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OPERA, the Oil, Petrochemical and Energy Risk Association, was established in 1979 as a forum for sharing and discussing technical information with regards to the managing of risk and associated insurance of the oil, gas, petrochemical and power generation industries. A key focus of OPERA over the past 40 years, through our members' meetings, has been the sharing of latest innovations, best practice and causes of losses to assist in the prevention of major incidents reoccurring.

In celebration of OPERA's contribution to learning over the past 40 years we have compiled this timeline to highlight 40 landmark incidents since 1979. Many have resulted in the promotion and widespread adoption of changes to risk management practices or regulation worldwide, and the lessons from each one remain of value today.

The ubiquity of Process Safety Management shortcomings in so many of these incidents illustrates that in spite of technology advances in the last 40 years, it is the interaction of people with their facilities that continues to be a dominant factor in these major events, and there is little to suggest that this pattern will change. Of these selected incidents, natural catastrophes account for the lowest number by category, although over the next 40 years this may well change as climate change may provide new challenges for the energy and power sectors.

Regardless of cause of loss, it is OPERA's intention to continue to make a difference by providing an environment to nurture the sharing of experience.

To learn more about OPERA and how to become a member visit us at oilpera.com.