1322114 December 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, DECEMBER 15, 2000, (http://www.chemsafety.gov).
Location : Woodlawn, Ohio, USA

Injured : 0 **Dead :** 0

Abstract

One hundred and fifty people were evacuated when a hydrochloric acid spilled during preparations for offloading. The incident occurred when a flange on a road tanker broke spilling several hundred gallons of acid. Fortunately no one was injured in the incident.
[evacuation, unloading, flange failure]

Lessons

[None Reported]

1318416 November 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, NOVEMBER 17, 2000, (http://www.chemsafety.gov), Disclaimer: The Chemical Incident Reports Center (CIRC) is an information service provided by the U.S. Chemical Safety and Hazard Investigation Board (CSB). Users of this service should note that the contents of the CIRC are not intended to be a comprehensive listing of all incidents that have occurred; many incidents go unreported or are not entered into the database. Therefore, it is not appropriate to use the CIRC database to perfrom statistical analysis that extends conclusions beyond the content of the CIRC. Also, although the CSB never knowingly posts inaccurate information, the CSB is unable to independently verify all information that it receives from its various sources, much of which is based on initial reports. CIRC users should also note that the CSB receives more comprehensive reports about incidents that occur in the U.S.; comparisons made between U.S. incidents and those in other nations should take this fact into consideration.

Location : Province, CUBA

Injured : 11 **Dead :** 5+

Abstract

An explosion occurred as troops were unloading a military truck at a munitions factory. Five people were killed and eleven injured in the incident. Three people are missing.

The cause of the explosion is not known. An investigation is underway.

[fatality, injury]

Lessons

[None Reported]

1317322 October 2000

Source : CNN INTERACTIVE, OCTOBER 23, 2000, (http://www.cnn.com).
Location : Texas, USA

Injured : - **Dead :** 1

Abstract

An explosion occurred on a road tanker containing 8,000 gallons of liquid propane as it was unloading its contents at a propane storage facility.
It has been reported that the incident occurred when the line exploded causing the tanker to catch fire and then the tanker itself exploded. One person was killed and another is missing. Nearby residents were evacuated as a precaution.
[fire - consequence, fatality, evacuation]

Lessons

[None Reported]

1317819 October 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, OCTOBER 19, 2000, (http://www.chemsafety.gov), Disclaimer: The Chemical Incident Reports Center (CIRC) is an information service provided by the U.S. Chemical Safety and Hazard Investigation Board (CSB). Users of this service should note that the contents of the CIRC are not intended to be a comprehensive listing of all incidents that have occurred; many incidents go unreported or are not entered into the database. Therefore, it is not appropriate to use the CIRC database to perfrom statistical analysis that extends conclusions beyond the content of the CIRC. Also, although the CSB never knowingly posts inaccurate information, the CSB is unable to independently verify all information that it receives from its various sources, much of which is based on initial reports. CIRC users should also note that the CSB receives more comprehensive reports about incidents that occur in the U.S.; comparisons made between U.S. incidents and those in other nations should take this fact into consideration.

Location : Diyarbakir, TURKEY

Injured : 130 **Dead :** 0

Abstract

A chlorine gas leak occurred at a water purification plant. The incident occurred as fire fighters were replacing containers of chlorine gas used to purify drinking water.
One hundred and thirty residents of a nearby city were affected by the release of the chorine gas and were hospitalised.
[gas / vapour release, injury]

Lessons

[None Reported]

1269406 October 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JUNE 21, 2000, (http://www.chemsafety.gov).

Location : Ojima, JAPAN

Injured : 28 **Dead :** 4

Abstract

An explosion occurred in a distilling tower at a chemical plant that produces hydroxylamine and other chemicals used in making computer chips and pesticides. Four workers were killed and twenty-eight were injured.
It is thought that the explosion may have been caused by the hydroxylamine being manufactured at the plant.
[chemical causes, distillation, fatality, fire - consequence, injury]

Lessons

[None Reported]

1321503 October 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, OCTOBER 4, 2000, (http://www.chemsafety.gov).
Location : West Chester, Ohio, USA

Injured : 4 **Dead :** 0

Abstract

Chemical fumes were released during a mixing process in a vat whilst making an epoxy product. The building and nearby businesses were evacuated. Four people were injured in the incident.
[chemical - fume, gas / vapour release, evacuation , injury]

Lessons

[None Reported]

1307415 September 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, SEPTEMBER 17, 2000, (http://www.chemsafety.gov).
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Location : Phoenix, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at an explosives test facility. The fire occurred when approximately 50 pounds of unknown chemicals were being mixed. Buildings in the surrounding area were evacuated.
The cause of the incident is not known. No one was injured in the incident.
[fire - consequence, mixing, evacuation, unidentified cause]

Lessons

[None Reported]

1307314 September 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, SEPTEMBER 15, 2000, (http://www.chemsafety.gov).
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Location : New York, USA

Injured : 11 **Dead :** 0

Abstract

Eleven workers were overcome when exposed to a release of dimethoate. The incident occurred as the workers were heating the chemical, usually the chemical is heated to approximately 150 degrees but in this case the chemical was heated to around 220 degrees.
Exposure to dimethoate can cause muscle spasms, nausea and headaches.
[operation inadequate, gas / vapour release, injury]

Lessons

[None Reported]

1306813 September 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, SEPTEMBER 14, 2000, (http://www.chemsafety.gov).
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Location : Trexlertown, USA

Injured : 0 **Dead :** 0

Abstract

An explosion occurred during distillation. An operator was injured whilst distilling a chemical. It is thought that a small fire occurred after the explosion. Cause of the incident is not known.
[fire - consequence]

Lessons

[None Reported]

1306608 September 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, SEPTEMBER 11, 2000, (http://www.chemsafety.gov).
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Location : West Deptford, USA

Injured : 3 **Dead :** 0

Abstract

A fire occurred at a refinery. It is reported that the fire occurred in a dewaxing unit used in the process of crude oil.
An investigation revealed that diesel fuel leaked from tubes that run through the heater into another heater, the fumes caught fire and released nitrogen oxides as a by-product of the fire.
Two workers and one fire fighter were injured in the incident.
[fire - consequence, gas / vapour release, refining, burns, injury]

Lessons

[None Reported]

1306408 September 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, SEPTEMBER 11, 2000, (http://www.chemsafety.gov).
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Location : Philadelphia, USA

Injured : 2 **Dead :** 0

Abstract

A fire occurred at an oil refinery injuring two people; one suffered serious burns and was transported to hospital.
The fire broke out due to equipment failure in a crude oil unit, thick black smoke was released as a result.
[fire - consequence, mechanical equipment failure, refining, injury]

Lessons

[None Reported]

1304001 September 2000

Source : ALTAVISTA, 5 SEPTEMBER, 2000, (http://www.altavista.com).
Location : Lefkandi, GREECE

Injured : 4 **Dead :** 1

Abstract

A bulk cargo ship broke in half during loading operations resulting in the immediate sinking of the ship. One person was killed and four others injured in the incident.
An estimated 200 to 500 tonnes of fuel was on board.
A large scale clean up is underway to mop up the spilled fuel oil from the tanker. It is thought that local environmental damage will occur as a result of the spill.
[marine transport, fatality, injury]

Lessons

[None Reported]

1297808 August 2000

Source : CHEMICAL SAFETY AND HAZARDS INVESTIGATION BOARD, AUGUST 9, 2000, (http://www.chemsafety.gov).

Location : Gebze, TURKEY

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a refinery. It is reported that the fire apparently occurred due to an overheated tank. A series of explosions followed sending several barrels of oil flying into the air. Fortunately no injuries occurred.
[fire - consequence, refining, overheating]

Lessons

[None Reported]

1294907 August 2000

Source : BBC NEWS, 7 AUGUST, 2000, (http://www.bbc.co.uk),; CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, AUGUST 8, 2000, (http://www.chemsafety.gov).

Location : Balikpapan, Borneo, INDONESIA

Injured : 2 **Dead :** 0

Abstract

An explosion and fire occurred at a refinery injuring two workers. It is not known what caused the incident. The plant has been closed for further investigation.

[fire - consequence, refining, plant shutdown, injury]

Lessons

[None Reported]

1295804 August 2000

Source : CHEMICAL SAFETY AND HAZARDS INVESTIGATION BOARD, AUGUST 8, 2000, (http://www.chemsafety.gov).
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Location : Hamilton, Ontario, CANADA

Injured : 0 **Dead :** 0

Abstract

An explosion and fire occurred at a steel mill when water leaked from a furnace. The leak in the furnace's cooling system reportedly caused a safety valve to open to vent pressure, inadvertently allowing oxygen to flow into the vessel, triggering off the explosion and fire. Fortunately no one was injured in the incident.
[fire - consequence, milling]

Lessons

[None Reported]

1282412 July 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JULY 14, 2000, (http://www.chemsafety.gov).
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Location : Rock Hil, USA

Injured : 0 **Dead :** 0

Abstract

A chemical reaction occurred during routine mixing of chemicals at a manufacturing company forcing the evacuation of the building.
The incident occurred as workers were mixing chemicals to make ink.
[unwanted chemical reaction]

Lessons

[None Reported]

1277003 July 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JULY 5, 2000, (http://www.chemsafety.gov).
(http://www.chemsafety.gov).
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Location : Columbia, USA

Injured : 3 **Dead :** 0

Abstract

A worker was covered with formaldehyde solution whilst loading the chemical on a shelf with a skip loader when the formaldehyde box hit the side of the shelf and broke the containers in side.
Three people were affected by the incident and all involved were decontaminated.
Formaldehyde is used generally as a disinfectant, germicide and preservative.
In large doses, the fumes can become overwhelm and cause eye irritation, coughing, upper respiratory problems, headaches, stuffy nose, nausea and fatigue.
[operation inadequate, contamination, people, spill, injury]

Lessons

[None Reported]

1274130 June 2000

Source : CNN.COM, U.S. NEWS, JULY 1, 2000, (http://www.cnn.com).
Location : Philadelphia, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a refinery that produces cumene, used to manufacture plastics and synthetics. The fire occurred due to a leak of hydrogen from a ruptured pipeline, which ignited.
The fire was brought under control with in a few hours and fire fighters remained on site to make sure escaping vapours burned out safely.
An investigation into the cause of the incident is being carried out.
[fire - consequence, refining]

Lessons

[None Reported]

1270225 June 2000

Source : BBC NEWS, 25 JUNE, 2000, (http;//www.bbc.co.uk),; CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JUNE 25, 2000, (http://www.chemsafety.gov).
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Location : Al-Ahmedi, KUWAIT

Injured : 49 **Dead :** 3

Abstract

An explosion occurred at an oil refinery killing three and injuring forty-nine people. Most of the injured suffered burns and cuts from flying glass.
Production was shut down and workers evacuated at the 444,000 barrels per day refinery.
The explosion occurred during attempts to try and control a gas leak in one of the pipelines. The force of the blast shattered windows in the office building at the complex.
Damage is estimated at $324 million (2000).
[refining, fatality, people, evacuation, plant shutdown, damage to equipment, fire - consequence, injury]

Lessons

[None Reported]

1272020 June 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JUNE 23, 2000, (http://www.chemsafety.gov).

Location : Waimairi, NEWZEALAND

Injured : 0 **Dead :** 0

Abstract

A chemical fire occurred at a yarn factory when a worker added water to a chlorine substance, which caused it to ignite.
Fort-five people were evacuated from the factory along with businesses within a 150-metre radius of the factory.
The fire was quickly extinguished using carbon dioxide fire extinguishers and the smoke was dispersed using the ventilation system.
[fire - consequence, mixing, drums, evacuation]

Lessons

[None Reported]

1308210 June 2000

Source : LOSS PREVENTION BULLETIN 154, 26.
Location : Scotland, UK

Injured : 0 **Dead :** 0

Abstract

A fire broke out at a refinery three days after an explosion occurred in a steam pipe at the facility.
The fire was quickly brought under control and it was reported that there had been no risk to the public safety.
[fire - consequence, refining, near miss]

Lessons

[None Reported]

1275210 June 2000

Source : CHEMICAL & ENGINEERING NEWS, JUNE 19, 2000.
Location : Gunma, JAPAN

Injured : 28 **Dead :** 4

Abstract

An explosion occurred at a hydroxylamine plant. Four people were killed and twenty-eight injured in the explosion. The incident is thought to have occurred due to hydroxylamine, which when purified has an explosive power similar to TNT, exploded. The material, which is used in the manufacturing of semiconductors, becomes unstable when heated.
Heating in one of the steps in the distillation of unrefined hydroxylamine.
[heating, fatality, injury]

Lessons

[None Reported]

1254101 June 2000

Source : BBC NEWS, 1 JUNE, 2000, (http//:www.bbc.co.uk).
Location : , UK

Injured : 0 **Dead :** 0

Abstract

A petrochemical complex had to be shut down due to an electrical fault.
A major incident control plan was activated when the fault was discovered and production was halted.
A controlled shutdown of all systems took place.
[electrical equipment failure, plant shutdown, refining]

Lessons

[None Reported]

1269327 May 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, MAY 31, 2000, (http://www.chemsafety.gov).

Location : Akron, USA

Injured : 3 **Dead :** 0

Abstract

A fire and explosion occurred three days after an explosion that injured two people. Three workers suffered serious burns.
The incident occurred, as workers were mixing chemicals in a large vat. The force of the explosion blew out a cement wall and caused a fire, which was quickly extinguished.
Damage is estimated at more than $1 million (2000).
It is thought that sparks from a passing forlift truck triggered the explosion.
[fire - consequence, unknown chemicals, injury]

Lessons

[None Reported]

1284109 May 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JULY 12, 2000, (http://www.chemsafety.gov).
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Location : Louisville, Kentucky, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred in a distillery at a brewery causing thousands of gallons of bourbon to spill into a nearby river killing more than 227,000 fish.
The spill created an oxygen-depleted cloud.
The company is to pay $499,739 (2000) to replace the fish stock.
The Natural Resource and Environmental Protection Cabinet is considering fining the company over $1 million (2000).
[fire - consequence, gas / vapour release, distillation]

Lessons

[None Reported]

12504May 2000

Source : THE DALLAS MORNING NEWS, MAY 4, 2000, (http://www.dallasnews.com).
Location : West Dallas, USA

Injured : 1 **Dead :** 0

Abstract

An explosion and fire occurred at a food processing plant seriously injuring a worker.
The incident occurred whilst the worker was mixing dough in the 29,000 square foot plant. More than half an hour after the explosion, part of the building collapsed.
The cause of the explosion is not known.
[fire - consequence, people, injury]

Lessons

[None Reported]

1248425 April 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 25 APRIL, 2000, (http://www.chemsafety.gov),
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Location : , USA

Injured : 2 **Dead :** 1

Abstract

An explosion occurred at a liquid petroleum gas plant killing one worker and injuring two others. The incident occurred in a gas bottle storage building at the plant whilst a gas tanker was being loaded.
A cylinder was gassing off at the time of the explosion.
An investigation into the cause of the incident is being carried out.
[loading, fatality, injury]

Lessons

[None Reported]

1289824 April 2000

Source : HAZARDOUS CARGO BULLETIN, JULY 2000,; LLOYDS LIST.
Location : Gateshead, UK

Injured : 2 **Dead :** 1

Abstract

An explosion occurred at an LPG plant in a gas bottle storage area killing one and injuring two others.
The incident occurred during unloading of a road tanker.
[fatality, injury]

Lessons

[None Reported]

1241402 April 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 3 APRIL, 2000, (http://www.chemsafety.gov).

Location : Fullerton, California, USA

Injured : 0 **Dead :** 0

Abstract

An explosion occurred in a university laboratory. The incident occurred when a lab student mixed a small amount of alcohol into a gallon tub of acid waste. It shattered beakers and caused a cabinet to burst open.
Property damage was estimated to be approximately $100 (2000).
[laboratory work, mixing, unwanted chemical reaction, damage to equipment, container]

Lessons

[None Reported]

1238328 March 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 28 MARCH 2000, (http://www.chemsafety.gov).

Location : Calgary, Alberta, CANADA

Injured : 0 **Dead :** 0

Abstract

A factory was evacuated after a road tanker spilled 150 litres of sodium hydroxide into a sewer system during unloading operations.
A leak occurred in the tanker causing the spill.
Sodium hydroxide has corrosive effects; contact on skin and toxic if fumes are inhaled.
[evacuation]

Lessons

[None Reported]

1236323 March 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 24 MARCH, 2000, (http://www.chemsafety.gov).
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Location : Lily, USA

Injured : 48 **Dead :** 0

Abstract

Sulphuric and hydrochloric acid were accidentally mixed resulting in two accidental releases of chlorine gas. The building was evacuated.
Forty eight people were treated for minor respiratory problems.
[sulphuric acid, gas / vapour release, evacuation, accidental mixing, mixer, injury]

Lessons

[None Reported]

1236223 March 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 23 MARCH, 2000, (http://www.chemsafety.gov).
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Location : Pennsville, USA

Injured : 3 **Dead :** 0

Abstract

An explosion occurred whilst loading an industrial dryer with a powdery substance wet with solvents. The three workers carrying out the operation were seriously injured in the blast.
An investigation into the incident is being carried out.
[drier, burns, injury]

Lessons

[None Reported]

1233017 March 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 20 OCTOBER, 1999, (http://www.chemsafety.gov).
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Location : Owens Crossroads, Alabama, USA

Injured : 1 **Dead :** 0

Abstract

An explosion occurred at a fireworks factory. The incident occurred whilst a worker was mixing chemical compounds when a reaction occurred, sparking a flash fire and explosion. The worker suffered severe burns to his body.
[fire - consequence, unwanted chemical reaction, unknown chemicals, injury]

Lessons

[None Reported]

1233117 March 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 20 MARCH, 2000, (http://www.chemsafety.gov).

Location : North Salt Lake City, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred as an employee was checking equipment while a tank truck was being filled at a loading dock at a refinery. Nearby fuel tanks were damaged in the blaze fortunately they did not explode.

The incident occurred when surplus gas from fuel hoses was being emptied into a steel bucket, which apparently built up static electricity and burst into flames. The operator threw the bucket away from his body causing an explosion.

The refinery offices were evacuated and underground pipes transferring petroleum products were shut-off.

[fire - consequence, road transport, damage to equipment, evacuation]

Lessons

[None Reported]

1245516 March 2000

Source : CNI NEWS, 24 MARCH, 2000, (www.cnionline.com),; CHEMICAL HAZARDS IN INDUSTRY, JUNE 2000.
Location : Cologne-Godorf, GERMANY

Injured : 0 **Dead :** 0

Abstract

A fire occurred in one of two distillation units for crude oil at a refinery. The incident occurred when a small fire started in the unit causing an explosion, which led to the main fire.
The fire took fire fighters approximately two hours to extinguish.
Damage is estimated at HFL 1M mark (2000).
No one was injured in the incident.
Nearby residents were warned to keep their windows closed and to remain indoors.
[fire - consequence]

Lessons

[None Reported]

1244715 March 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 16 MARCH, 2000, (http://www.chemsafety.gov)

Location : Rosepine, Los Angeles, USA

Injured : 2 **Dead :** 0

Abstract

Two workers were injured during welding operations when an explosion occurred. The incident occurred when the workers were loading diesel tanks and a gasoline air compressor on a logging truck.
An investigation into the incident is being carried out.
[road transport, injury]

Lessons

[None Reported]

1228513 March 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 13 MARCH, 2000, (http://www.chemsafety.gov).
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Location : Lat Krabang, THAILAND

Injured : 1+ **Dead :** 1

Abstract

An explosion occurred at a petrol station when an oil tanker was offloading it cargo caught fire. Severe damage occurred to the surrounding area.
It is thought that a spark from an oil pump may have caused the fire and explosion.
[road transport, unloading, fire - consequence, fatality, burns]

Lessons

[None Reported]

1224101 March 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, MARCH 2, 2000, (http://www.chemsafety.gov).
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Location : Clifton, USA

Injured : 1 **Dead :** 0

Abstract

A chemical reaction occurred inside a 5-gallon container creating fumes forcing workers to be evacuated. One person was injured in the incident.
The incident occurred whilst a worker was mixing epoxy sealant for use on a floor being laid.
An investigation into the cause of the chemical reaction is being carried out.
[unwanted chemical reaction, gas / vapour release, injury, evacuation]

Lessons

[None Reported]

1223929 February 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, MARCH 1, 2000, (http://www.chemsafety.gov).
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Location : , USA

Injured : 30 **Dead :** 0

Abstract

A chemical reaction occurred when a contractor driving a road tanker poured a chemical into the wrong tank causing chlorine vapour to be formed.
Approximately 30 people were taken to hospital for treatment for eye, throat and nose irritation. Workers were evacuated in the incident.
The incident occurred when the driver pumped sodium hypochlorite, bleach used for odour control, into the tank with a residue of ferric chloride, another odour control chemical.
An investigation into the incident is being carried out.
[unwanted chemical reaction, evacuation, injury, gas / vapour release, human causes, unloading]

Lessons

[None Reported]

1220414 February 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, FEBRUARY 15, 2000. (http://www.chemsafety.gov).
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CHEMICAL HAZARDS IN INDUSTRY, APRIL 2000.

Location : Santee, USA

Injured : 3 **Dead :** 0

Abstract

An explosion and fire occurred in an extruder at a plastics manufacturing plant.
The explosion occurred when three workers were mixing polyethylene granules, raw sulphur powder and potassium nitrate granules to produce a semisold.
The explosion occurred after the materials were heated, before any material had emerged from the extruder barrel. The building was evacuated.
The workers suffered third-degree burns and shrapnel injuries.
The cause of the explosion is under investigation.
[fire - consequence, injury]

Lessons

[None Reported]

1219811 February 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, FEBRUARY 14, 2000. (http://www.chemsafety.gov).
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Location : Zhangshu City, CHINA

Injured : 2 **Dead :** 6

Abstract

A tanker truck exploded whilst unloading oil at a gas station. The explosion killed six and injured two and totally destroyed a nearby three-storey building.
The gas station included five large oil tanks and unknown ammount of oil barrels.
The cause of the explosion is still under investigation.
[fire - consequence, road transport, explosion, fatality, injury]

Lessons

[None Reported]

1219309 February 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, FEBRUARY 9, 2000. (http://www.chemsafety.gov).
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Location : , USA

Injured : 2 **Dead :** 0

Abstract

An explosion occurred when two acids were mixed, injuring two graduate students.
The incident occurred when the two students were mixing nitric acid and hydrochloric acid in a glass container when the chemicals exploded.
An investigation is underway into the possibility that another chemical may have been in the container.
The students were treated for minor injuries.
[mixing, contamination, injury]

Lessons

[None Reported]

1214113 January 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JANUARY 14, 2000, (http://www.chemsafety.gov).
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Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

A potentially toxic chemical reaction at a tire and rubber company caused the evacuation of plant personnel and a nearby highway.
The incident occurred when workers noticed an elevated temperature in a tank holding two chemicals used in the production of antioxidants used in plastics.
The tank was hosed down to keep it cool and disaster specialists were put on alert and the road closed.
It was reported that no leakage occurred when a stabilising agent was added to the tank to stop any possible reaction.
An investigation found the tank used to mix the two chemicals, mercaptan and methylacrylate, was not the one normally used. A full investigation into the incident is being carried out.
[unwanted chemical reaction, mixing]

Lessons

[None Reported]

1214311 January 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JANUARY 12, 2000, (http://www.chemsafety.gov).
Disclaimer: The Chemical Incident Reports Center (CIRC) is an information service provided by the U.S. Chemical Safety and Hazard Investigation Board (CSB). Users of this service should note that the contents of the CIRC are not intended to be a comprehensive listing of all incidents that have occurred; many incidents go unreported or are not entered into the database. Therefore, it is not appropriate to use the CIRC database to perfrom statistical analysis that extends conclusions beyond the content of the CIRC. Also, although the CSB never knowingly posts inaccurate information, the CSB is unable to independently verify all information that it receives from its various sources, much of which is based on initial reports. CIRC users should also note that the CSB receives more comprehensive reports about incidents that occur in the U.S.; comparisons made between U.S. incidents and those in other nations should take this fact into consideration.

Location : , USA

Injured : 4+ **Dead :** 0

Abstract

An explosion and fire occurred at a nut company when a forklift truck was being refuelled from a propane tank. The fire damaged the company's roof and gutted it's interior, the fire also spread to an adjacent two storey apartment block.
Three people were hospitalised and one declined medial attention.
[fire - consequence, loading, damage to equipment, injury]

Lessons

[None Reported]

7995 03 December 1999

Source : BBC NEWS, DECEMBER 3, 1999, (http://www.bbc.co.uk),; CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, FEBRUARY 4, 2000, (http://www.chemsafety.gov).

Location : , THAILAND

Injured : 15 **Dead :** 7

Abstract

A fire occurred after an explosion at an oil refinery which killed two people and injured fifteen.
The explosion and fire caused between US$23m-27m (1999) damage.
Four out of the nine oil tanks exploded. The force of the explosion was felt in nearby towns and several kilometres away.
Thirty million litres of petrol stored in the four burned-out tanks was destroyed in the blaze.
It is thought that the explosion occurred after the storage tanks were overfilled and that a spark may have ignited the vapour.
[burns, fire - consequence, refining, damage to equipment, fatality, injury]

Lessons

[None Reported]

1288202 December 1999

Source : ICHEME
Location : , THAILAND
Injured : 13 **Dead :** 8

Abstract

A fire occurred on a tank farm at a refinery killing eight people and injuring thirteen others.
The incident occurred when a gasoline tank overflowed releasing vapours, which entered several nearby buildings.
Two operators went to investigate and it is thought that the vehicle they were driving ignited the vapours causing a number of explosions, starting fire on a tank containing 1.5 million litres gasoline which quickly spread to four other larger tanks.
A large quantity of foam was used in extinguishing the fire.
An investigation into the incident is underway.
[fire - consequence, gas / vapour release, refining, fatality, injury]

Lessons

[None Reported]

1176210 November 1999

Source : U.S. CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, (http://www.chemsafety.gov).

Location : Malden, USA

Injured : 0 **Dead :** 0

Abstract

Approximately 100 lbs of ammonia was released from a plant, forcing the evacuation of 200 nearby residents. The ammonia was used as a cooling agent for a refrigeration unit.
The cause is not known. No one was injured.
[gas / vapour release]

Lessons

[None Reported]

1195110 October 1999

Source : THE SUN, OCTOBER 11, 1999.
Location : , UK

Injured : 0 **Dead :** 0

Abstract

A leak of hazardous chemicals occurred in an airport cargo area when a package fell from a baggage trailer. Fire crews were put on stand-by whilst the package which had just been unloaded, was examined.
An area of half a mile from the main runway and terminal was sealed off.
The substance was found to be a low-grade hazardous chemical.
[leak, spill, unloading, near miss, container, chemicals unknown]

Lessons

1195405 October 1999

Source : BBC NEWS, OCTOBER 5, 1999, (http://www.bbc.co.uk).
Location : , SOUTH KOREA

Injured : 77 **Dead :** 0

Abstract

During maintenance safety checks at a nuclear plant, twenty two workers were exposed to radiation after a coolant leak.
The incident occurred when workers mixing a uranium solution triggered a nuclear chain reaction at the processing plant. Fifty five people, mainly workers and emergency personnel who responded to the incident were also exposed to radiation.
[radioactive, contamination, people, unwanted chemical reaction]

Lessons

[None Reported]

1208330 September 1999

Source : EUROPEAN CHEMICAL NEWS, 25/31 OCTOBER 1999,; JOURNAL OF THE BRITISH NUCLEAR ENERGY SOCIETY, FEBRUARY 2000, VOLUME 39, NUMBER 1,; CHEMICAL HAZARDS IN INDUSTRY, MARCH 2000,; NEW SCIENTIST, 8 JAN 2000, (2220), 5,; BBC NEWS, 27 APRIL, 2000, (http://www.bbc.co.uk).

Location : Tokaimura, JAPAN

Injured : 56 **Dead :** 2

Abstract

A nuclear chain reaction was triggered whilst workers were mixing a uranium solution at a uranium processing plant. Fifty five people, mainly plant workers and emergency personnel were exposed to the radiation, three remained in a serious condition. Nearby residents were evacuated.
It is thought that a water jacket designed to cool the tank, fuelled the reaction as it reflected neutrons back into the uranium solution. The emergency crews managed to drain the water jacket and douse the hot material with boric acid, which absorbs neutrons. The reaction finally stopped after 17 hours.
[radioactive, reactors and reaction equipment, evacuation, people, unwanted chemical reaction, human causes]
The following conclusions were published in the Journal of the British Nuclear Energy Society, February 2000, Volume 39, Numer 1.
The cause of the incident has been confirmed. A solution of 16.6 kg of 18.85 enriched uranium was poured into a precipitation tank, in which the maximum amount of uranium should be limited to 2.4 kg.
[fatality]

Lessons

[None Reported]

1164819 August 1999

Source : YAHOO NEWS, 19 AUGUST, 1999, (http://www.yahoo.co.uk),; HAZARDOUS CARGO BULLETIN, NOVEMBER 1999.
Location : , UK

Injured : 2 **Dead :** 2

Abstract

Two factory workers were found dead on the ground floor of a paint-stripping factory after being overcome by fumes in a suspected chemical leak.
It is thought that they had mixed some chemicals, different to the normal process, causing a gas to be released, possibly methylene chloride which is a fast acting asphyxiant.
Fire crews were at the scene wearing protective clothing, but the first two ambulance attendants who had rushed in were unprotected. They attended hospital for a check up.
[fatality, asphyxiation, mixing, accidental mixing, gas / vapour release]

Lessons

[None Reported]

1164717 August 1999

Source : BBC NEWS, AUGUST 19, 1999, (http://www.bbc.co.uk),; HAZARDOUS CARGO BULLETIN, NOVEMBER 1999.
Location : , TURKEY

Injured : - **Dead :** -

Abstract

A fire occurred at an oil refinery complex when a fatal earthquake struck the country.
The earthquake struck Turkey's populous north west, an area that accounts for a third of the country's economic output. Many large companies were badly hit.
[fire - consequence, refining, oil, tank, fatality, damage to equipment]

Lessons

[None Reported]

1231109 August 1999

Source : CORPUS CHRISTI TIMES, 10 AUGUST, 1999,; CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 13 MARCH, 2000, (http://www.chemsafety.gov).

Location : Corpus Christi, USA

Injured : 0 **Dead :** 1

Abstract

An explosion occurred on a boiler at a refinery killing a worker. It is not known what caused the explosion but an investigation is being carried out. The plant did not shutdown due to the incident.
[boiler explosion, fatality, refining]

Lessons

[None Reported]

1175603 August 1999

Source : BBC NEWS, AUGUST 5, 1999, (http://www.bbc.co.uk).
Location : , AUSTRALIA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. A marine tanker spilled approximately 80,000 litres of light crude oil into a harbour, releasing a cloud of acrid fumes over a city.
Emergency crews fought to contain the spill, the bulk of the oil was contained behind booms.
An number of birds have been found coated with oil, and dead fish have been washed up on the shore.
It is thought the cause of the spill was due to an open valve while the ship was discharging.
[gas / vapour release, ecological damage, unloading, operation inadequate]

Lessons

[None Reported]

1209905 July 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, DECEMBER 1999,; OCCUP. HAZARDS, OCT 1999, 61(10), 22,24.

Location : , USA

Injured : 24 **Dead :** 0

Abstract

An explosion occurred at an aluminia refinery injuring 24 workers, who mostly suffered with burns. The cause of the explosion is thought to have been due to a power supply interruption. The flow pumps stopped operating due to the power interruption, pressure built up in the last sealed vessel in the digestion area where caustic alumina cools down from the process temperature of 300 degrees C.
[electrical equipment failure, power supply failure, refining, injury]

Lessons

The company is to review its safety procedures.

12079July 1999

Source : CHEMICAL HAZARDS IN INDUSRY, OCTOBER 1999.
Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

A leak of methyl diethanolamine occurred from a sulphur recovery unit at a refinery. A vapour cloud formed which lasted for about twelve hours. No injuries were reported.
[gas / vapour release, refining]

Lessons

[None Reported]

1179030 June 1999

Source : HAZARDOUS CARGO BULLETIN, SEPTEMBER 1999.
Location : Washington, USA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. A bulk carrier spilt 750 l fuel oil while loading from a bulk barge. Skimmers and booms failed to stop the slick from moving up-river.
[spill, pollution]

Lessons

[None Reported]

1178928 June 1999

Source : HAZARDOUS CARGO BULLETIN, SEPTEMBER 1999.
Location : , AUSTRALIA

Injured : 0 **Dead :** 0

Abstract

A marine transport incident. A faulty coupling on a floating hose used for discharging crude oil to a refinery was found to be leaking causing the spillage of 270 m3 of crude oil into the sea, fouling the beaches and a reef.
[coupling failure, unloading, pollution]

Lessons

[None Reported]

1178727 June 1999

Source : HAZARDOUS CARGO BULLETIN, SEPTEMBER 1999.
Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

A marine transport incident. A loading arm broke whilst a tanker was discharging crude oil at a refinery. Approximately 4,000 l of oil was spilt into the dock. Booms and skimmers were used to clean-up.
[unloading, mechanical equipment failure, spill]

Lessons

[None Reported]

1210424 June 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, DECEMBER 1999,; ENDS REP., SEP 1999(296), 16-17.
Location : , UK

Injured : 0 **Dead :** 0

Abstract

A paper producer was fined £17,500 (1999) and ordered to pay costs of £37,445 (1999), for polluting three rivers causing the death of approximately 10,000 fish.
A white liquid was discovered entering a culvert under the mill. A stock record proved that there had been a spillage to drain of cationic flocculant.
[ecological damage, pollution, leak, milling, spill, environmental]

Lessons

[None Reported]

1180021 June 1999

Source : HAZARDOUS CARGO BULLETIN, SEPTEMBER 1999.
Location : Pennsylvania, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred in a sulphur extraction unit at a refinery after power failure. A plume of smoke was released.
[fire - consequence, power supply failure, gas / vapour release, refining, separation equipment]

Lessons

[None Reported]

1287104 June 1999

Source : NATIONAL TRANSPORTATION SAFETY BOARD, DCA99MZ006, (http://www.ntsb.gov).
Location : Michigan, USA

Injured : 1 **Dead :** 1

Abstract

A chemical reaction occurred during unloading from a road tanker of sodium hydrosulphide solution into a storage tank containing ferrous sulphate at a tannery. Sodium hydrosulphide solution reacts with ferrous sulphate solution to produce hydrogen sulphide, a poisonous gas.
An employee in the basement of the building smelled a pungent odour and lost consciousness, and fortunately regained consciousness ten minutes later. The driver of the road tanker was found unconscious and was later pronounced dead at the scene. It was determined that he had died from the effects of hydrogen sulphide gas.
[storage tanks, unwanted chemical reaction, fatality, management system inadequate, human causes, injury, evacuation]

Lessons

[None Reported]

1100826 May 1999

Source : CHEMICAL WEEK, JUNE 2, 1999.
Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

A four hour electrical outage halted production at a plant which includes a 427,000-bbl/day refinery and adjacent chemical operations such as ethylene and polyolfins.
The power loss forced flaring at the refinery and some chemical units, there were no fires or measurable toxic emissions. There were no reported injuries.
An investigation into the outage is being carried out.
[electrical equipment failure, near miss, refining]

Lessons

[None Reported]

1143118 May 1999

Source : CNN.COM, U.S. NEWS, MAY 18, 1999, (http://www.cnn.com).

Location : , AFRICA

Injured : 0 **Dead :** 0

Abstract

A fire occurred causing the shutdown of a refinery. The plant is estimated to be down for approximately seven to eight months.
The fire damaged the primary distillation unit and the main crude pipeline supplying the refinery.
[fire - consequence, plant shutdown, refining, damage to equipment, crude oil]

Lessons

[None Reported]

1208607 May 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, JULY 1999.
Location : , USA

Injured : 1 **Dead :** 0

Abstract

A fire occurred at a refinery causing one of the two coker units to be shut down. One worker was injured in the incident.
[fire - consequence, refining, injury]

Lessons

[None Reported]

1199505 May 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, JULY 1999.
Location : , INDIA

Injured : - **Dead :** 5

Abstract

A fire occurred in a hydrogen gas compressor of a hydro cracker unit at a refinery. Five people were killed. All other units in the refinery and supplies from the terminal were not affected by the fire.
[fire - consequence, fatality, refining]

Lessons

[None Reported]

1147606 April 1999

Source : CHEMICAL WEEK, APRIL 14, 1999.
Location : , YUGOSLAVIA

Injured : 0 **Dead :** 0

Abstract

Eleven missiles were fired into a petrochemical complex which produces polyvinyl chloride, polypropylene and nitrocellulose.
[deliberate acts, refining, processing, polyvinyl chloride (PVC)]

Lessons

[None Reported]

11996April 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, JULY 1999.
Location : , USA

Injured : 0 **Dead :** 0

Abstract

An explosion and fire occurred on a hydrocracker unit at a refinery. There were no injuries and the fire was controlled within two hours.
[fire - consequence, refining]

Lessons

[None Reported]

11025March 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, JUNE, 1999, ISSN 0265-5271,; CHEM ENG NEWS, 1 MAR, 1999, 77(9), 11.

Location : , USA

Injured : 11 **Dead :** 5

Abstract

Investigations are underway into the cause of an explosion at a plant producing hydroxylamine, killing five people and injuring six. Five fire fighters were also injured.

The site purifies and concentrates free-base hydroxylamine solutions at 50% and 30% concentrations. The material is used to clean electronic chips. It is reported that the company was distilling hydroxylamine under vacuum at 120 degrees F when the explosion occurred.

[purification, distillation, fatality, injury]

Lessons

[None Reported]

1052423 February 1999

Source : CHEMICAL ENGINEERING, MAR, 1999,; LOSS PREVENTION BULLETIN, 146, 24.
Location : Martinez, California, USA

Injured : 1 **Dead :** 4

Abstract

A fire occurred in a distillation unit at a refinery. The unit was shutdown.
Four workers were killed and the other was critically injured when a fireball engulfed them while they attempted to repair a leak in a pipe containing highly flammable naphtha.
[fire - consequence, refining, fatality, burns, injury]

Lessons

[None Reported]

1052019 February 1999

Source : CNN.COM, U.S. NEWS, FEB 20, 1999, (http://www.cnn.com),; LOSS PREVENTION BULLETIN, 146, 24.
Location : Pennsylvania, USA

Injured : 13 **Dead :** 5

Abstract

An explosion on a chemical plant occurred while workers were making hydroxylamine, a chemical used in etching computer semiconductors.
The blast created a 4 foot crater inside the two-storey building and blew out its concrete walls. The explosion shook buildings and homes for miles and sent metal studs, concrete and insulation flying for several hundred yards.
The explosion was probably caused by improper mixing of chemicals inside the building.
The chemicals involved in making hydroxylamine include potassium hydroxide and hydroxylamine sulphate.
The explosion caused an estimated $4 to $5 million (1999).
[chemical causes, processing, fatality, damage to equipment]

Lessons

Hydroxylamine can become volatile if it gets too hot or dry.

1100919 February 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, MAY 1999, ISSN 0265-5271,; CHEM.MARK. REP., 1 MAR 1999, (WEBSITE: HTTP://WWW.CHEMEXPO.COM/CMRON-LINE)

Location : Pennsylvania, USA

Injured : 13 **Dead :** 5

Abstract

Five people were killed and thirteen injured in an explosion at a plant. The premises were flattened and several neighbouring units were seriously damaged.
The plant was processing hydroxylamine.
It is thought that the explosion may have been caused by the improper mixing of hydroxylamine and potassium hydroxide.
An investigation is underway.
[fatality, damage to equipment, injury, operation inadequate]

Lessons

[None Reported]

11012January 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, MAY 1999, ISSN 0265-5271,; CHEMPRESS, 19 FEB, 1999, 33(4), 4(DUTCH).
Location : Ludwigshafen, GERMANY

Injured : 0 **Dead :** 0

Abstract

Around 100 kg of the red pigment rhodamine was discharged into a nearby river from a purification installation. This substance is soluble in water and at certain concentrations is poisonous to aquatic life but in this case toxicity can be ruled out due to the high degree of dilution of the rhodamine.
[spill, chemical]

Lessons

[None Reported]

2113 1999

Source : CHEMICAL HAZARDS IN INDUSRY, OCTOBER 1999,; LOSS PREVENTION BULLETIN, 147, PAGE 15-16.

Location : ,

Injured : 0 **Dead :** 0

Abstract

A fire occurred on two separate offshore compressor stations on the same day. Considerably damage occurred to the electrical systems. Purge gas was ignited in both incidents by static generated by a snow-storm. Fires occurred later on, in the power turbine exhaust compressor units. Venting, in one case, caused a severe increase in the stack flame such that the crew had to take shelter.
[fire - consequence, damage to equipment, weather effects, fuel gas]

Lessons

The following recommendations were made:
1. Investigation of the reliability of fuel gas supply.
2. Improvement in the instrument air supply.
3. Check unit vent valves.
4. Review choice of actuators and location of systems under winter conditions and reconsidering certain venting and staffing issues.

114931999

Source : CHEMICAL HAZARDS IN INDUSTRY, JUNE 1999.
Location : , USA

Injured : 6 **Dead :** 5

Abstract

An explosion occurred at a plant producing hydroxylamine, killing five people and injuring six. Five fire fighters were also injured. The plant was distilling hydroxylamine under vacuum at 120 degrees F when the explosion occurred.
An investigation into the cause is being carried out.
[processing, fatality, distillation, injury]

Lessons

[None Reported]

122291999

Source : CHEMICAL HAZARDS IN INDUSRTY, JANUARY 2000,; J. OCCUP. HEALTH SAFT. AUG. N. Z., OCT 1999, 15(5), 406.
Location : , AUSTRALIA

Injured : 0 **Dead :** 0

Abstract

Approximately 10,000 titres of LPG escaped to atmosphere when the driver of a road tanker drove off without disconnecting the filling hose. Fortunately the gas did not ignite. Nearby residents were evacuated as a precaution.
After an investigation the company was fined A$2500 (1999), for the storage tank not meeting the Australian Standard
AS 1596-1989.
[gas / vapour release, human causes, evacuation, loading, storage tanks]

Lessons

[None Reported]

10458December 1998

Source : BIRMINGHAM POST, 15 DECEMBER, 1998.
Location : Birmingham, UK

Injured : 0 **Dead :** 0

Abstract

Firemen had to dam part of a river when a fuel spill threatened to cause an environmental disaster. More than 100 gallons of diesel poured out of a broken fuel pump at a bakery and started to run down nearby storm drains.
The fuel flooded on to the company's loading yard and covered an adjacent road before running into the drainage system and a nearby river.
Fire crews later joined by clean-up experts battled to contain the spill. The area was hosed down with detergent and a special lorry brought in to suck up the diesel.
Inflatable bungs were used to try to block the storm drains where they met the river.
Absorbent booms and pads, specially developed to deal with ocean oil spills, were laid across the river to suck up the fuel.
A driver failing to turn off a pump after filling up a lorry was to blame for the spill, confusion about how to close down the diesel system had added to the problem.
Water and wildlife suffered minimal damage.
[environmental, pump failure, loading, operation inadequate]

Lessons

[None Reported]

1044126 November 1998

Source : CNN.COM, U.S. NEWS, 1998,
(http://www.cnn.com).
CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 99-05-1-WA (http://www.chemsafety.gov).
Disclaimer: The Chemical Incident Reports Center (CIRC) is an information service provided by the U.S. Chemical Safety and Hazard Investigation Board (CSB). Users of this service should note that the contents of the CIRC are not intended to be a comprehensive listing of all incidents that have occurred; many incidents go unreported or are not entered into the database. Therefore, it is not appropriate to use the CIRC database to perfrom statistical analysis that extends conclusions beyond the content of the CIRC. Also, although the CSB never knowingly posts inaccurate information, the CSB is unable to independently verify all information that it receives from its various sources, much of which is based on initial reports. CIRC users should also note that the CSB receives more comprehensive reports about incidents that occur in the U.S.; comparisons made between U.S. incidents and those in other nations should take this fact into consideration.

Location : Washington State, USA

Injured : 0 **Dead :** 0

Abstract

An explosion and fire occurred in a coker of a refinery after a power failure which was caused by recent wind storm. The fire was quickly extinguished.
[fire - consequence, refining, strong winds, electrical equipment failure]

Lessons

[None Reported]

1138217 November 1998

Source : EUROPEAN CHEMICAL NEWS, 23-29 NOVEMBER, 1998.
Location : Augusta, Georgia, USA

Injured : 46+ **Dead :** 0

Abstract

Approximately 46 people were injured when a chemical release sent a toxic vapour cloud of sulphur dioxide and oleum into the atmosphere.
The incident occurred when an instrumentation failure caused chemical vapours to vent from a smokestack instead of collecting in a storage tank.
[gas / vapour release, venting, storage tanks, injury]

Lessons

[None Reported]

1232616 October 1998

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 29 JULY, 1999, (http://www.chemsafety.gov).

Location : Trainer, USA

Injured : 0 **Dead :** 0

Abstract

A 55-foot tank containing approximately 16,000 barrels of jet fuel exploded and burned at a refinery.
Approximately 700,000 gallons of fuel burned for more than four hours before being brought under control.
No deaths or serious injuries were reported.
[explosion, fire - consequence, refining]

Lessons

[None Reported]

1033017 September 1998

Source : YAHOO NEWS, ASSOCIATED PRESS, (http://www.yahoo.com).
Location : , USA

Injured : 0 **Dead :** 0

Abstract

Bomb incident leads to evacuation. Workers loading a bomb from a B-52 accidentally dropped the 500 pound explosive on a runway, prompting the evacuation of more than 700 nearby homes.
The bomb did not explode, however the bomb was transported to a remote bomb range where it was placed 15 feet deep, covered with dirt and detonated.
[human causes, near miss]

Lessons

[None Reported]

1290902 August 1998

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a refinery when a crude splitter pump around line ruptured due to sulphidation corrosion. The rupture released hydrocarbons with a composition from naphtha to diesel. The pump around stream was released as a vapour with an ensuing fire jet ignited by autoignition. The fire caused subsequent ruptures in the main fractionator and other equipment.
No one was injured.
[fire - consequence, gas / vapour release, damage to equipment, refining]

Lessons

[None Reported]

1221921 May 1998

Source : HAZARDOUS CARGO BULLETIN, FEBRUARY 2000.
Location : Kalgoorie, AUSTRALIA

Injured : 0 **Dead :** 0

Abstract

A leak of sodium cyanide occurred from a tank container.
The incident occurred due to poor design and location of a pressure test nozzle, which led to the leakage of cyanide liquor from a tank container unloading liquid sodium cyanide.
The end frames of the container normally protect such nozzles but in this case the nozzle protruded over the top of the end frames. It is thought that the nozzle had been damaged when another tank container was lifted over this unit.
[spill, design inadequate]

Lessons

The owner of the tank container has subsequently redesigned the unit and all similar containers so that the pressure test nozzle does not protrude outside the body of the tank.
The company concerned has prohibited the practice of lifting containers over the top of tank containers.

1041404 March 1998

Source : LOSS PREVENTION BULLETIN, 140, 23.; CONGLETON CHRONICLE, 6 MARCH 1998.; CONGLETON CRONICLE, 5 MARCH 1998.
Location : , UK

Injured : 0 **Dead :** 0

Abstract

An explosion occurred in a grain hopper, located within a mill building. The employees working in the mill at the time of the explosion all escaped without injury. Witnesses reported flames and clouds of blue-black smoke being emitted from the mill building after the explosion, which sent debris over a wide area around the mill, including the railway line, which was temporarily closed while checked for any damage caused to the track by flying debris.
[silo/hopper, damage to equipment, milling, fire - consequence, solids processing equipment]

Lessons

[None Reported]

1059318 February 1998

Source : ICHEME
Location : , FRANCE
Injured : 1 **Dead :** 0

Abstract

An contractor operator fell into the water between a ship and a jetty.
The accident occurred when the seaman on board the ship released the tanker hose. It appears that the hose knocked the operator off the jetty into the water. Fortunately the location of a nearby ladder allowed the operator to climb back to safety. He suffered extensive bruising.
The cargo loading arm was too short (outside its operating envelope) for this particular ship and therefore the transfer operation had to be undertaken using a hose.
The incident happened during darkness and the operator was not wearing a life jacket.
The immediate cause of the accident was the unsafe way in which the hose was released from the ship to the shore.
The basic causes were :
1. An inadequate loading arm which was not designed with an operating envelope which takes into account all the various factors including the freeboard of the largest and smallest tankers.
2. No risk assessment (task analysis) prior to using a hose instead of the loading arm.
3. A potential contributory factor was that the jetty operator was not wearing a life jacket since he could have easily drowned.
[fall, marine transport, operator error, design or procedure error]

Lessons

[None Reported]

1198808 January 1998

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

An actuator lever on a drain valve failed causing approximately 260 litres of highly flammable monomer to spill. The incident occurred when a 5 tonne charge of highly flammable monomer and catalyst was being loaded into a reactor in a low temperature resin plant.
[valve failure, loading, reactors and reaction equipment, mechanical equipment failure]

Lessons

[None Reported]

105921998

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A large oil spill (approximately 175 m3) occurred in a crude oil tank farm from two failed joints/gaskets. The failed joints/gaskets were at pipeline flanges on a 10 bar/150 psig section of the crude oil transfer line from the offshore production platform to crude tank at the refinery.
The flange joints/gaskets failed due to the transfer line being overpressured. The motorised inlet valve to the tank automatically closed following a spurious extra high tank level trip and this subjected the line to the maximum full discharge pressure of the offshore platform's main oil line pump. The line was not designed for the shut-in pressure.
The resultant spill of crude oil in the pipe trench was recovered using water and vacuum trucks.
The crude oil on the pig receiver slab was recovered in the oily/water sewer systems.
[joint failure, gasket failure, material transfer, refining]

Lessons

The report stated:
The implementation and continued integrity of process safety management systems must be assured through auditing and planned inspections

1040725 December 1997

Source : LOSS PREVENTION BULLETIN, 139, 23.; THE CHEMICAL ENGINEER, 15 JANUARY 1998.
Location : Bintulu, Sarawak, MALAYSIA

Injured : 12 **Dead :** 0

Abstract

An explosion occurred in an air separation unit on a distillate plant. Several major pieces of plant equipment were found approximately 1.3 kilometres from the site of the explosion.
This explosion was consistent with airburst energy of approximately 36GJ, one of the largest ever land-bsed industrial explosions.
The explosion occurred in a cryogenic distillation column, which generates gaseous oxygen and was not related to the distillate synethesis process technology.
The explosive rupture of the column was caused by the massive runaway combustion of sections of the aluminium plate fin type main vaporiser, which is located in the bottom of the low-pressure column above a large inventory of liquid oxygen.
The aluminium is presumed to have been ignited by combustible material, probably formed from hydrocarbons originating from the inlet air, which are assumed to have accumulated undetected on the aluminium surface from the liquid oxygen circulation through the closed sections of the main vaporiser.
The exact mechanism by which the combustion was triggered is at present unknown, and is under detailed investigation.
The fire occurred in two of fourteen product tanks, which contained naphtha and kerosene.
[distillation, fire - consequence, cryogenic equipment]

Lessons

[None Reported]

1106528 November 1997

Source : ICHEME
Location : , UK
Injured : 0 **Dead :** 0

Abstract

Between November 28, 1996, and January 5, 1997, power station steam boiler failures occurred.
Five high pressure (>100 bar) boilers in a power station steam boiler suffered tube failures. This was as a result of a water chemistry regime which had been operated for a considerable time with pH and chloride levels outside an acceptable operating range. Five tube failures occurred in 4 of the 5 boilers in the station over the period November 29,1996 to December 14, 1996. The mode of failure varied between longitudinal splits and "window" failures where a section of the tube split and opened up like a door or window. In two of these cases there was evidence of localised thinning, but not in the other three. In all cases the failures resulted in the boilers depressurizing safely into the fire box.
The spate of rapid failures on separate boilers and metallurgical examination of the failed tubes pointed to a common problem causing internal corrosion of the tubes. The investigation, therefore, focused on the quality of the water provided to all of the boilers. A number of changes had taken place in the power station operations over the last 12 months. In particular a change from dosing the boiler feed water with ammonia to amine in June, 1996. Caustic having previously been used as a dosing chemical until ammonia completely replaced it. It was concluded that the mechanism driving the failures was hydrogen induced embrittlement caused by on-load acid attack, probably chloride based. It was also agreed that the onset of the acid attack could be measured in weeks/months rather than months/years. The localised thinning evident with two of the failures was attributed to "caustic gouging" which was postulated as "old" damage to when caustic soda was used as a boiler treatment chemical. Acid attack is generally associated with poor bulk boiler water chemistry, for example, high chloride and/or oxygen levels and low pH. It is known that boilers operating on an all volatile regime (in this case ammonia and more recently amine based) are particularly susceptible to this form of attack and that great care should be taken to maintain low levels of chloride. A boiler operating in a non-volatile alkali regime (e.g., caustic) can tolerate higher chloride levels because of the buffering effect of the alkali.
Following a study of the water chemistry history, it is concluded that the immediate cause of the boiler failures was acid chloride attack of the boiler tubes. The acid attack occurred as a result of the water chemistry regime which had been operated for some time with the pH being much lower than the control range. There had also been a number of very low pH values during the period which would have resulted in the spate of rapid failures. The level of chlorides in the boiler feed water had also increased over the last 6 months as a result of the change to the blowdown from the boilers from continuous to "as required" between June and August, 1996, as a result of the perceived improvement in water quality. The speed of the failures was also enhanced by weak spots in the tubes as a result of caustic gouging which would have occurred when the boiler water was treated with caustic. The tubes were also prone to attack as a result of the protective magnetite layer being greater than 100 microns which would have cracked, allowing the water to penetrate to the metal surface.
Boiler operators were evidently aware of the low pH situation since mid November reports show, double and triple ammonia dosage required. Power station management were apparently unaware of these situations. No data was prepared in graphical form to show trends, although after the events this shows significant effects on blowdown and pH. Both the laboratory and the operators analysed the boiler feed water supply and drum quality. The operator tests were used to control the dosages, and laboratory testing had been recently reduced from daily to three times a week. A review of the results shows that the laboratory results are more accurate owing to superior calibrated equipment, and prompt testing in a professional manner. In fact, the level of knowledge of boiler water chemistry, the criticality of controlling pH and conductivity was not widely appreciated. On line measuring instruments were available in the control room but in various states of disrepair and not relied upon, and some alarm settings for conductivity were set beyond the allowable operating range.
The following repairs were made before recommissioning. The water chemistry for all boilers was changed to caustic injection, continuing the amine injection to increase pH to normal operating levels and to provide a more effective buffer against chlorides. The blowdown was returned to a continuous regime.
[refining, embrittlement, operation inadequate, plant / property / equipment]

Lessons

The following recommendations were made:
1. Institute improved process monitoring (e.g., Statistical Process Control) in all areas of the power station.
2. Establish water quality regime for the appropriate operating envelope for the long-term treatment chosen (caustic or all-volatile).
3. Provide relevant refresher training on water treatment, the impact of water chemistry on the performance of the boilers, and action to be taken if deviations are outside agreed control limits.
4. Investigate the demineralization plants operational performance in detail, preferably in conjunction with the manufacturer.
5. Control the boiler water chemistry in a more disciplined way within the agreed operating envelope.
6. Ensure that all existing on-line analytical control room instrumentation is working to their intended design.
7. Review and re-state roles and accountabilities of all staff in the power station, and check staff understanding and competency to carry out these roles.
8. Review and re-state accountabilities and relationships between the Power Station and the Laboratory for sample testing and subsequent use of test results for boiler water control.
9. Review the alarm and trip settings for on-line analytical instruments and provide guidelines to the operators for changing the stepwise cycle on the demineralization plant regeneration cycle.
10. Develop a structured program for improving the reliability of boiler plant.
Lessons Learned:
1. Plotting of water quality test results highlights trends in measured parameters.
2. Changes in operating regimes (blowdown and pH Control) require rigorous
3. Management of Change review.
4. By-passing routine (designed) operating procedures must signal that an operational review is required, and indicates that operators are taking unusual or desperate attempts to maintain the operation

1199024 November 1997

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

An incident occurred during unloading operations, xylene was being transferred from a road tanker to a bulk storage tank. Confusion concerning the capacity of a tank and the amount of material in it caused the tank to overflow.
The spilled material was contained in a bund, covered with foam and then pumped into 200 l drums.
[storage tanks, operation inadequate]

Lessons

[None Reported]

1198614 November 1997

Source : ICHEME
Location : , GERMANY
Injured : 0 **Dead :** 0

Abstract

During the filling out of paint an explosion occurred in a mixing vessel. No one was injured and no environmental damage occurred. The mixing vessel was damaged though.
[mixer, damage to equipment, near miss]

Lessons

[None Reported]

1136711 November 1997

Source : LLOYDS LIST, 12 NOV, 1997.
Location : , USA

Injured : 1 **Dead :** 0

Abstract

A fire occurred at a loading terminal of a petroleum storage facility whilst three road tankers were being loaded. A series of explosions occurred as a result. The cause of the fire is not known.
[fire - consequence, unidentified cause, injury]

Lessons

[None Reported]

1138808 November 1997

Source : LOSS CONTROL NEWSLETTER, 1997.
Location : , INDIA

Injured : 0 **Dead :** 0

Abstract

A spillage of diesel occurred on one of two lines carrying petroleum products from ship to terminal.
The explosion occurred in the sewage and storm water drains around the area. Following the explosions, the line was shutdown and filled with water to locate the possible source of the leakage.
[unloading, pipework, marine transport, drains & sewers]

Lessons

[None Reported]

11664October 1997

Source : TANKER CASUALTY REPORT NO. 22, TANKER CASUALTY DATA EXCHANGE SCHEME, INTERNATIONAL CHAMBER OF SHIPPING, LONDON.
Location : ,

Injured : 0 **Dead :** 1

Abstract

A fire and explosion occurred in the pump room of a tanker resulting in the death of one crew member.
A tanker was lying at anchor in a harbour after discharging a cargo of crude oil. Residual crude oil was being consolidated by pumping into one or two centre tanks. Leaks had earlier occurred into the pump room from defective lines, pump and valve glands and joints resulting in an oil and water mixture in the pump room bilges. A rag was used to plug one of the leaking seals in a bulk head. The atmosphere in the pump room was checked with an explosimeter but no gas was detected.
An officer and a cadet checked that the transfer was taking place satisfactorily. The officer left the cadet to go to breakfast. Some four minutes later an explosion occurred and smoke poured from the pump room and the two pump room ventilators, and a large amount of debris was blown onto the deck. The alarm was raised and a fire fighting party assembled but could not enter the pump room because of the smoke. The pumpman who was on the deck at the time of the explosion informed that the cadet had gone into the pump room earlier.
Because of concern over the possibility of further explosions and the unlikely possibility that the cadet had survived in the pump room, the pump room door was closed, the ventilators sealed and carbon dioxide released into the pump room to extinguish the fire.
The fire was extinguished some hours later and the pump room entered. The cadet was found dead on the upper pump room grating. The body showed evidence of extensive burning and the post mortem showed that he had died almost immediately.
Investigation showed that the source of ignition in the pump room came from the opposite side of the ship to where the main cargo pump and eductor were operating. Two pump room fans were operating at the time. It was noted that an inspection access plate on one of the fans was missing and it transpired had been missing for some time. The bearings on this fan had collapsed and markings on the fan showed that fan blades had been touching at some time. It was concluded the cause of the explosion was a spark created by the fan blades touching, combined with an explosive air mixture resulting from the oil and water accumulation in the pump room.
The reason why the cadet entered the pump room without the authorisation of a responsible officer was not known, but it was concluded that his action had nothing to do with the explosion.
[fire - consequence, marine transport, unloading, fatality]

Lessons

The incident showed the importance of maintaining bilges dry at all times in order to prevent any possibility of an explosive mixture forming where machinery is operating.
1. Ventilation in pump rooms should be designed to prevent the formation of stagnant air pockets, especially low down. This was shown by the fact that the accident occurred despite consistent explosimeter readings of 5% being recorded over the previous two days. As a result of the accident, the company modified its ships to ensure that ventilation suctions points were below the pump room floor lower grating. Also, all ships with steam fans were modified by removing the fans to outside the pump room and fitting them in the main ventilator trunkings.
2. Regulations regarding unauthorised entry to certain sections should be enforced more strongly.

1136915 September 1997

Source : LLOYDS LIST, 16 SEP, 1997, 2 OCT, 1997,; OIL AND GAS JOURNAL, 22 SEP, 1997,; THE CHEMICAL ENGINEER, 25 SEP, 1997,; THE GUARDIAN, 18 SEP, 1997.

Location : , INDIA

Injured : 20 **Dead :** 60

Abstract

A leak of LPG occurred on a pipeline whilst unloading a marine tanker causing an explosion and igniting six storage tanks, some containing kerosene. The fire burned for two days and damaged 19 tanks, a two storey office block and five other buildings. The smoke caused the port to be shut down and 100,000 people evacuated.
[fire - consequence, damage to equipment, fatality, evacuation]

Lessons

[None Reported]

8789 14 September 1997

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, NOV,; CHEMICAL HAZARDS IN INDUSTRY NO: 1, JANUARY 1998.
Location : Hindustan, ASIA

Injured : 20+ **Dead :** 45+

Abstract

A fire and explosion occurred at a refinery killing forty-five people and injuring at least twenty others.
The incident occurred when leaking petroleum gas ignited. The explosion ignited a further six storage tanks as fire spread through out the refinery.
Approximately 100,000 were evacuated from their homes.
[fire - consequence, evacuation, fatality, refining, injury]

Lessons

[None Reported]

8842 14 September 1997

Source : HAZARDOUS CARGO BULLETIN, 1997, NOV. OGJ,; LOSS CONTROL NEWSLETTER, 1997.
Location : Visakhapatnam, INDIA

Injured : 0 **Dead :** 56

Abstract

A pipe carrying LPG from harbour to refinery leaked setting off an explosion that triggered a fire which engulfed 18 storage tanks. Seven tanks containing LPG and crude oil were completely destroyed. 100,000 people were reported to have left the area following the incident. All within a 500 metre radius of explosion were killed. Pre-commissioning of one of the crude distillation units will begin in December, the second in January.
[fatality, refining, road tanker, damage to equipment, leak]

Lessons

[None Reported]

1106813 September 1997

Source : ICHEME
Location : , USA

Injured : 0 **Dead :** 0

Abstract

During the changing over of vacuum bottoms pumps due to cavitation problems, an electrical switchboard tripped out. This was due to a failure of the vacuum bottoms pump motor windings. The electrical outage caused the shutdown of most pump-around circuits. Loss of pump-around caused the vacuum tower off-gas effluent separator to overflow liquid to the off-gas burner in the furnace. This caused fire within the furnace. Although the fuel gas was shut off, the vacuum tower off-gas supply is separate from the fuel gas system and continued to burn. Feed through furnace coils was continued using turbine driven pumps, but the naphtha preheat convection coils flow was shutdown and a tube in this section burst adding to the fire. Shortly after 17:00 hrs. the South vacuum bottoms pump began cavitating slightly. This continued off and on until approximately 19:45 hrs. when the decision was made to swing to the North pump. The operator pushed the switch to start the North pump and sparks came out of the conduit junction box at the motor. Immediately the call came from the inside operator that the other pumps on the crude and vacuum unit had failed. The operator immediately started the turbine driven raw crude charge and vacuum charge pumps, maintaining flow through the heater coils. Flow of naphtha through the convection section and vacuum bottoms rundown were not lost since these particular pumps motors came from a different electrical supply. When the pumps shutdown, the inside operator reduced the crude rate. Some steam was also cracked open to the furnace passes to maintain velocity. The furnace temperature controllers were left on automatic during this time. The individual motor circuit breakers on the unit's main switch rack were all switched off and attempts were made to reset the switch rack's feeder breaker at the electrical substation without any success. At approximately 20:05 hrs., fire was reported under the furnace and smoke was coming from the stack. The operator checked the fuel gas knock out drum and finding no liquid level shut off the fuel gas to the furnace, including the pilots. Shortly thereafter the crude overhead line was opened to the flare to control the tower pressure. Snuffing steam was put into the furnace and the pass steam was opened fully and the crude and vacuum charge pumps were shutdown. The naphtha charge pump feeding convection back coils was shutdown at approximately 20:10 hrs. The fire continued burning and at 20:30 hrs. a "pop" was heard coming from the furnace, which was the naphtha coil rupturing. At this time the Emergency Response Team was called out. The Vac 2 System effluent off gas was blocked in at the separator at 21:00 hrs. The fire was extinguished at 22:30 hrs.
This incident was initiated by the failure of the North Vacuum Bottoms pump motor and the tripping out of the CrudeVac Unit's primary electrical switch rack. However, the heater fire that followed was caused by the continual combustion of the Vacuum Tower off-gases after the main fuel gas was shut-off and the heater blocked in. The switch to divert this stream was not located near the fuel gas valves and was not activated until later. In addition, the loss of pump-around cooling in the Vacuum Tower resulted in carry over of heavy oil to the heater via a full separator drum. (The high level alarm is located in a satellite control station which was not manned in the emergency and the pumps for discharging the separator were out of action due to the power failure). Fuel was also added to the heater due to back flow from the gas oil stripping tower due to a connection downstream of the main fuel gas emergency isolation valves. A previous safety review had identified a number of shortcomings in instrumentation design and process piping design. This resulted in the emergency fuel shut off valves being relocated in the 1994 turnaround to keep the operator further away from the furnace during emergencies. However, the HAZOP which formed part of the Management of Change procedure did not cover process considerations focusing only on mechanical and installation issues.
The rupture of the naphtha convection coil provided considerable additional fuel to the fire. The naphtha charge pump kept operating because its electrical supply is taken from a separate switch rack, but was shut down 25 minutes after the other pumps lost power. The line ruptured 20 minutes later causing major damage to the heater. After the incident decoking of the radiant bank coils in crude service was required, even though some steam was cracked into the furnace passes, with the charge rate reduced, due to the furnace temperature controllers being left on automatic.
[refining, electrical equipment failure, fire - consequence, furnace, damage to equipment, operation inadequate, mechanical equipment failure]

Lessons

The following recommendations were made:
1. Emergency shutdown procedures must cover the actions for all types of breakdowns/failures.
2. Operator/instrumentation interfaces must be thoroughly evaluated during HAZOPs or safety reviews that form part of the Management of Change procedure.
3. P&IDs must be field checked prior to a HAZOP in case of non-recorded, past modifications.
4. Refresher training must cover all aspects of safe furnace operations including emergency response plans.
5. All fuel sources to be isolated in an emergency to be clearly identified.
The following corrective actions were taken in the refinery:
1. Relocate the vacuum effluent off-gas diversion switch to a position near the emergency fuel gas shut-off valves for the furnaces.
2. As part of an Instrument Upgrade Project, re-route the diversion switch into the Central Control Center.
3. Provide alarms for the vacuum effluent system to the North Inside Operator as part of the Instrument Upgrade Project.
4. Disconnect two tie-ins to the fuel gas line between the emergency shut off valves and the furnace burners. Provide an alternative source of fuel gas for these two existing users that includes the connection with the gas oil stripping tower.
5. When management of change reviews are held for the purpose of relocating process piping, the HAZOP and the P&IDs should be reviewed along with a field check for verification of other process tie-ins and potential process consequences.

1114911 September 1997

Source : ICHEME

Location : ,

Injured : 1 **Dead :** 0

Abstract

An ammonia tank was taken out of service in the July for its scheduled 3-year inspection and hydraulic pressure test. At that time, the opportunity was taken to replace valves A and B (part of a block and bleed system) on the steaming-out line to the tank. On August 13, during the first discharge of ammonia from a truck, an operator discovered valve B was leaking. He identified this valve as type suitable for steam but unsuitable for ammonia service. As a precautionary measure the tank was taken out of service with the ammonia depressured through a water drum to absorb the gas. At 09:00 hrs. on September 11, three contractors (including the supervisor) arrived to get their work permit signed and issued. The work to replace valves A and B involved the dismantling of the small diameter pipe that was fixed to the ammonia tank at flange 2. The Operator (Issuing Authority for the work permit) wrote on the permit form that the tank still contained ammonia vapours. He also informed the contractors that it would be necessary for them to wear breathing apparatus for all the work associated with the piping/valves to the tank. He did not, however, write this requirement on the permit form. At 14:00 hours, two of the three contractors (excluding the supervisor who was busy on another job) returned to disconnect flange 1. The contractor working on the flange wore breathing apparatus while the other stood by the breathing air gas bottle. While working on flange 2, the contractor's supervisor returned, put on breathing apparatus and assisted his colleague in removal of the pipe. The contractor's supervisor then decided to remove the leaded joint and clean it by scraping. At that moment he decided to remove his breathing apparatus (presumably to see more clearly) because he considered the atmosphere to be safe. As he bent down near the flange opening he was exposed to ammonia vapour. He was driven to the first aid station by one of his colleagues and transferred to hospital.
[unloading, gas / vapour release, safety procedures inadequate, permit to work system inadequate, asphyxiation]

Lessons

The issue of a work permit which, after all, is only a piece of paper does not by itself make a maintenance job safe. This is dependent upon the care and attention given by the Issuing Authority in the removal of known hazards and making certain that those performing the work are made fully knowledgeable of any remaining potential hazards and precautionary measures to be followed.

During any maintenance/repair work, replaced equipment or parts thereof must have exactly the same specification unless the modification is authorized under the Management of Change procedure.

Those who issue permits-to-work must be formally trained and certified as a competent Issuing Authority for a specific process area/unit.

Contractor's supervisors who act as a Performing Authority by accepting permits and the conditions for the work must be trained in this responsibility.

8840 10 September 1997

Source : HAZARDOUS CARGO BULLETIN, 1997, NOV. REUTER,; CHEMICAL HAZARDS IN INDUSTRY NO: 1, JANUARY 1998.
Location : Ohio, USA

Injured : 7 **Dead :** 1

Abstract

A fire and explosion occurred at a resin plant killing a worker and injuring seven others.
The incident occurred in a vessel in which phenol, formaldehyde and sulphuric acid were being mixed to make binding agent, which is used in sandings coatings for automotive metal moulding.
An investigation is being carried out into the cause of the incident.
[fatality, fire - consequence, injury]

Lessons

[None Reported]

8824 30 August 1997

Source : HAZARDOUS CARGO BULLETIN, 1997, NOV, LLOYDS LIST.
Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

An explosion and fire occurred in a No.1 cargo tank of a barge loading toluene. The fire was extinguished in 15 minutes using foam agent.
[fire - consequence]

Lessons

[None Reported]

2165 11 August 1997

Source : LOSS CONTROL NEWSLETTER, 1997.
Location : , JAPAN

Injured : 0 **Dead :** 0

Abstract

A fire broke out when heated residue oil leaked from a pipe extending from the crude distillation unit and caught fire. The leakage occurred when workers were checking a flowmeter in the pipe.
[fire - consequence, inspection]

Lessons

[None Reported]

8941 31 July 1997

Source : HAZARDOUS CARGO BULLETIN, 1997, SEP. REUTER.
Location : Kirikkale, TURKEY

Injured : 0 **Dead :** 1

Abstract

An explosion occurred in a storage tank in an oil refinery killing a worker taking measurements on top of the tank. The blast was reported to have been due to gas compression in the asphalt filling tank.
[storage tanks, refining, fatality]

Lessons

[None Reported]

8940 29 July 1997

Source : HAZARDOUS CARGO BULLETIN, 1997, SEP. REUTER.
Location : Izmit, TURKEY

Injured : 29 **Dead :** 0

Abstract

A fire occurred following an explosion in a paint mixing department of a car factory. Twenty nine workers fell ill due to toxic fume inhalation.
[fire - consequence, processing, toxic gas]

Lessons

[None Reported]

8926 19 July 1997

Source : HAZARDOUS CARGO BULLETIN, 1997,
Location : , CANADA

Injured : 3 **Dead :** 1

Abstract

An explosion and fire occurred onboard a marine tanker while preparing to load. The fire destroyed the wharf.
[fire - consequence, loading, fatality]

Lessons

[None Reported]

8917 09 July 1997

Source : HAZARDOUS CARGO BULLETIN, 1997, SEP. REUTER.
Location : Craiova, ROMANIA

Injured : 2 **Dead :** 16

Abstract

An experimental, multiple-detonation bomb exploded during loading onto a fighter bomber as part of a test.
[explosion, testing, air transport]

Lessons

[None Reported]

8890 04 June 1997

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG. FAIR PLAY.
Location : Nanjing, CHINA

Injured : 0 **Dead :** 0

Abstract

A fire and explosion occurred on a marine tanker with 19,700 tonnes of crude being unloaded. The tanker and one barge sank at anchorage.
[fire - consequence, unloading, sinking]

Lessons

[None Reported]

1115011 May 1997

Source : ICHEME
Location : , USA

Injured : 0 **Dead :** 0

Abstract

At 04:45 hrs., a tube leak was discovered in a naphtha treater furnace. The furnace was built in 1958 with one and a quarter percent chrome aluminised tubes. Most of the tubes were replaced with 5% chrome in the late 1950s and early 1960s because of tube failures due to overheating. The tube that failed was a 1960 replacement tube. The designed firing rate was 47.9 MM BTU/Hr. Presently, it runs at 71.5 MM BTU/Hr. This change in operating conditions went through the "management of change" procedure in February, 1997. Although the furnace would not have meet the companies recommendations for burner to tube spacing in a new installation, it was determined to be an acceptable safe operation if tube skin temperatures were monitored and kept under 925 degrees F (496.1 degrees C).

Over the past year, the refinery had started the implementation of a furnace management program on this particular furnace. Some of the items addressed were burner maintenance and adjustment, additional instrumentation and calibration with operator training. Improvement was noted in its operation since then, but the furnace tube failed anyway.

Prior to the incident, the operation of the furnace and process unit were normal. The furnace tube leak occurred in a bottom row tube of the south coil. Smoke was detected coming from the convection heater stack at 04:45 hrs. by two supervisors as they were exiting the control room's south door. The furnace tube leak was verified by a supervisor who, was able to see the smoke coming out of the naphtha treater furnace stack and the flames in the fire box. He warned others to stay away from the furnace. Several operations personnel went on to the eastside deck to verify the leak, but because of the flames in the box they were not able to see where the leak was. They went to the westside deck and were able to view inside the box, then left the furnace area. Less than a minute after their departure, at about 04:58 hrs., according to the process alarm, the tube massively failed and engulfed the furnace structure in flames. For the operations personnel who had been on the furnace deck, this was truly a "near miss" event.

The fire alarm was sounded, security was called to page the emergency response team, and the fire department was summoned. A decision was also made to shut down the other units. The furnace was quickly isolated (about 05:15 hrs.) and the fire was contained to the furnace area and under control within 20-30 minutes.

Total loss was about $3 million (£1.7 million) (1997). Business interruption accounted for $2.2 million (£1.2 million) (1997) and property damage $0.8 million (£0.6 million) (1997). The naphtha treater furnace was recommissioned on May 24, 13 days later.

An investigation found that the failed tube, which was a 5 Cr tube, was coked locally in between two burners closest to the east end of the furnace (south pass). A tight adherent layer of coke, about a quarter inch in thickness, was inside the tube located on the fire side of the tube. This layer of coke could be expected to raise the temperature of the tube close to 300 degrees F. This led to longer term overheating and eventual longitudinal bulging. A crack occurred causing the initial release of naphtha into the firebox. This was followed a few minutes later by the tube being ripped open circumferentially releasing 600 psig naphtha into the furnace. This type of failure is not typical, but is more likely to occur in high pressure services.

[heating, furnace, tube, furnace tube, overheating, tube failure, fire - consequence, rupture]

Lessons

The following recommendations were made:

Continued flame impingement on tubes in any hydrocarbon furnace will lead to localised coking and eventual tube failure. Management of change procedures must be applied when changes to materials are proposed, or when duty beyond original design is required.

Tube leaks in furnaces operating at high pressure are likely to have a sudden and catastrophic failure. Attempting to make further visual inspections is a significant risk.

Emergency response plans should be regularly tested, and include the communications and "call out" systems.

Process operators must be trained in the actions to be taken following a tube rupture.

8970 May 1997

Source : CNN INTERACTIVE, US NEWS STORY PAGE, JULY, 1997. THE ASSOCIATED PRESS, (http://www.cnn.com).
Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

An explosion occurred at a refinery causing at least two tank fires. No injuries were reported.
It was not known what was burning so nearby residents were warned to stay in doors because of smoke from the blaze.
[fire - consequence, refining]

Lessons

[None Reported]

8790 29 April 1997

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, NOV.
Location : Buckinghamshire, UK

Injured : 1 **Dead :** 1

Abstract

A fire broke out at a chemical works killing one person and injuring an other. The incident occurred in a plastic manufacturing plant which produces dispersions, gutter seals and antistatic sealants and coatings.
A violent deflagration inside a nearly closed mixing pot ejected burning material out of the feed opening and spread the fire to other parts of the factory. The chemicals being mixed were calcium peroxide and chlorinated paraffin. The fire, which it is thought may have been preceded by an explosion, spread rapidly across the workroom, killing one employee who was some distance from where the initial fire broke out. A second man was injured and was detained in hospital. The accident investigation will focus on determining the cause of the fire and why it spread so quickly across the workroom.
[fire - consequence, fatality, processing, injury]

Lessons

[None Reported]

3088 04 April 1997

Source : LOSS CONTROL NEWSLETTER, 1997.
Location : , GERMANY

Injured : 0 **Dead :** 0

Abstract

A fire started when a mixture of isopropyl alcohol and a solvent ignited ignite due to an electrostatic spark during the mixing of the two substances. Leaking solvents were responsible for the extension of the blaze to the production unit.
[fire - consequence]

Lessons

[None Reported]

7650 15 March 1997

Source : LOSS PREVENTION BULLETIN, 134, 24.
Location : ,

Injured : 28 **Dead :** 0

Abstract

Twenty eight people were taken to hospital after a chemical alert at an airport. Ground staff unloading the aircraft found 68 powdered chemicals, thought to be pesticides, leaking into the hold and giving off toxic fumes.
Fire crews in chemical protection suits and breathing apparatus were called. Ambulances took casualties to two local hospitals. The victims had inhaled fumes, though none was seriously affected.
[spill, gas / vapour release]

Lessons

[None Reported]

9005 March 1997

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, SEP.
Location : , SPAIN

Injured : 0 **Dead :** 0

Abstract

15,000 litres of hydrochloric acid were accidentally released at a chemical plant. The spill occurred during the unloading of a tanker.
[road tanker, human causes]

Lessons

[None Reported]

8999 March 1997

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, SEP.

Location : ,

Injured : 0 **Dead :** 0

Abstract

A fire occurred at an oil refinery whilst down for maintenance. No injuries were reported.
[fire - consequence, refining]

Lessons

[None Reported]

9055 25 January 1997

Source : CNN.COM, U.S. NEWS, (http://www.cnn.com).
Location : ,

Injured : 12 **Dead :** 0

Abstract

An explosion occurred at a 400,000 tonne middle distillate synthesis plant causing severe damage to the plant. Two production tanks, one containing naphtha and the other kerosene were set on fire as a result of the explosion, the remaining eight product and two sludge tanks were cooled off to prevent any further possible spread.
The plant produces various products ranging from distillates to waxes, averaging 1,200 tonnes per day.
[damage to equipment, distillation]

Lessons

[None Reported]

1132612 January 1997

Source : LLOYDS LIST, 15 JAN, 1997.
Location : , USA

Injured : 0 **Dead :** 0

Abstract

A fire which broke out in refinery burnt itself out without causing injuries or environmental damage. Water was brought to site after company's own water pumps failed. The fire was located in a pressurised blending unit containing flammable gas took about 5 hours to burn out after fuel source was shut off. [fire - consequence, refining]

Lessons

[None Reported]

1106903 January 1997

Source : ICHEME
Location : , FRANCE
Injured : 2 **Dead :** 0

Abstract

A fire broke out at gas oil hydrodesulfurization unit. The fire was caused by a leak of gas oil and gaseous products from the flange of a temperature control valve. The fire, restricted to the reactor section, was put out within 35 minutes by the refinery fire brigade. Two operators were injured while manoeuvring an extinguisher, but did not incur a lost time accident. The incident occurred following gasoil feed upset in the late morning, heavy rain in the afternoon and a hailstorm at about 22:30 hrs. The fire resulted in damage to control valves, piping, cables and associated heat exchangers.
[flange, valve, refining, rain, design inadequate, inspection inadequate, fire - consequence, flange failure, injury]

Lessons

Wafer type valves which, by design, are installed by "insertion" are unreliable and liable to leak.
All wafer valves to be identified and a risk assessment carried out to review their continued suitability in service.
Critical flanges need to be identified and regularly inspected, following an established procedure.
The investigation team concluded that the incident was caused by the following factors:
1. Inherent design weakness of the wafer type valves.
2. The poor condition of the flanges on the valves and piping.
3. Thermal shock imposed on the valves due to severe weather conditions (rain and hailstorm) and process upset earlier on in the day.

8477 1997

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, SEP.
Location : Gateshead, UK

Injured : 0 **Dead :** 0

Abstract

An explosion destroyed an oil fired boiler. No-one was injured in the incident.
[heating]

Lessons

[None Reported]

8478 1997

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, SEP.
Location : ,

Injured : 1 **Dead :** 0

Abstract

LPG gas which leaked during tanker filling caused an explosion and fire at a depot. One worker who was loading the tank into the vehicle was burned and needed hospital treatment. A further 200 people were evacuated.
[fire - consequence, burns, road tanker, evacuation]

Lessons

[None Reported]

8987 1997

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, OCT.

Location : ,

Injured : 7 **Dead :** 0

Abstract

A safety valve burst on a 1100 litter distillation tank, spraying paint stripper over an industrial estate.
[safety equipment failure, spill, injury]

Lessons

[None Reported]

111541997

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A flash fire occurred as a driver was preparing to load his truck. Evidence suggests that a static spark ignited residual gasoline vapours in the truck's vapour return pipe and vapour recovery hose as the latter was in the process of being connected up to the truck. The fire was extinguished by closing the cover of the truck's vapour recovery pipe and by a second driver using a hand-held fire extinguisher. There were no injuries to employees and no damage to the loading rack equipment.

The driver had pulled under the loading rack, set the truck's brake and connected the earthing/grounding wire. The weather was clear and dry (temp 80 degrees F) (27 degrees C) (humidity 27-32%). The driver was wearing the correct personal protective equipment.

The system had shown a green light indicating it was safe to start to attach the vapour return hose. The system was subsequently tested and found to be in good working order on both the loading rack and on the truck. The system is "self-checking" and the green light denotes satisfactory earthing and grounding which permits the truck to load product. However, the system does not indicate that the product loading hose and the vapour recovery hose are electrically continuous and grounded/earthed. The loading rack electrical structure ground/earth was tested and found to have less than 1.0 ohm resistance to true ground/earth. The overhead vapour recovery system piping was electrically bonded to the loading rack structure and no stray currents were found. The vapour recovery collection pipe on the truck's tank was properly attached and electrically bonded to the trailer. However the vapour return/recovery hose did not have an embedded static wire and was not electrically bonded to the loading rack structure. Continuity testing of the loading rack's product loading and vapour return/recovery hoses was not included in the facility's preventative maintenance plan. It could not be determined how the static charge accumulated in the vapour recovery hose.

The second driver also found that the operating handle on the truck mounted fire extinguisher used to extinguish the flares was difficult to depress due to an accumulation of road grime.

[fire - consequence, loading, road transport, lack of earthing, electrical]

Lessons

All parts of the road truck loading system must form a continuous electrically conductive path including the vapour return/recovery piping/hose arrangement.

8650 22 November 1996

Source : LLOYDS LIST, 1996, NOV, 25. EUROPEAN CHEMICAL NEWS, 1996, DEC, 9.
Location : Litvinov, CZECH REPUBLIC

Injured : 0 **Dead :** 0

Abstract

An explosion and fire occurred in storage tanks at refinery.
[fire - consequence, refining]

Lessons

[None Reported]

1196819 November 1996

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

A release of hydrogen chloride occurred when a scrubber was not able to cope with the release of fumes during tanker unloading operations. Two contractors were affected by the release.
[gas / vapour release, mechanical equipment failure]

Lessons

[None Reported]

8647 11 November 1996

Source : LLOYDS LIST, 1996, NOV, 13.
Location : Los Angeles, USA

Injured : 0 **Dead :** 0

Abstract

An explosion rocked the refinery which occurred in a unit using high temperature and pressure to remove sulphur.
[refining]

Lessons

[None Reported]

1196607 November 1996

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

A night shift was converting bright dope into matt dope using a mixer by adding titanium paste. When the operator went to discharge the mixer he opened the wrong valves. The dope was discharged to old pipework which at the time was being decommissioned and had an open end. Approximately 2000 kilograms of matt dope was released. The dope was approximately 73% acetone and 27% acetate.
[operator error, mixing, spill, decommissioning]

Lessons

[None Reported]

1108907 November 1996

Source : ICHEME
Location : , FRANCE
Injured : 0 **Dead :** 0

Abstract

An off-site crude unit charge pump operating in parallel with another, caught fire from the mechanical seal about one and a half hours after a common alarm had sounded. The initially small fire spread to the adjacent pumps and the crude unit was shut down for 24 hours until one of the pump's electrical wiring and instrumentation could be repaired. The cause of the vibration leading to the seal failure is either motor bearing failure or coupling failure due to loss of alignment, and there was evidence of cavitation an hour before the initial vibration alarm.
On this refinery the Crude Distillation Unit control room is fed from three identical crude oil feed pumps (A), (B), (S) located off-site in the crude tank farm area about 1 km from the unit. In normal operations two pumps are running in parallel with one spare. Each pump is fitted with a common alarm for six bearing temperatures (two on the electric motor, four on the pump itself) and a vibration detector. At the time of the incident (A) and (S) were running. Analysis of flow recordings and tank levels shows a reducing flow rate as tank level (1) fell. This was a usual event and the new tank (2) was placed in service at 05:50 hrs., about an hour before the first common alarm. Vibration analyser charts show evidence of cavitation in (S) at 05:50 hrs. and this disappeared after the tank change. The common alarm sounded in the control room at 06:48 hrs. Because no vehicle was available and because the alarms were considered unreliable, it was left to the day operator to check the alarm on his rounds, about one and a half hours later. By this time the pump operation had deteriorated seriously, crude was leaking and the fire developed. It was promptly extinguished by the fire crew but the crude unit was shut down until the electrical wiring for one of the other pumps was restored allowing start-up.
Two potential immediate causes have been identified. These are:
1. Rupture of the coupling membranes.
2. Failure of the bearing on the coupling side of the motor due to lack of oil or mechanical misalignment.
[fire - consequence, mechanical equipment failure, excessive vibration, design or procedure error, fire - consequence, refining, pump bearing, plant shutdown, lubrication failure]

Lessons

The following recommendations were made:
1. Operators must respond to alarms, no matter if they may be nuisance alarms.
2. Equipment does have a limited performance capacity, and operating at extremes places operations at risk.
3. Monitoring devices must be maintained in proper working order, especially those for remote operating areas where operator surveillance is less frequent.
4. Mechanical integrity must be maintained by use of the correct part of the equipment, as designed by the equipment supplier.

8473 24 October 1996

Source : EUROPEAN CHEMICAL NEWS, 1996, NOV, 4.
Location : Sakai, JAPAN

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a refinery causing shortage of xylene.
[fire - consequence, refining]

Lessons

[None Reported]

8649 12 October 1996

Source : LLOYDS LIST, 1996, NOV, 23.
Location : Virginia, USA

Injured : 0 **Dead :** 0

Abstract

A desulphurisation unit at refinery was shut down after a fire in the unit's furnace.
[fire - consequence, refining]

Lessons

[None Reported]

1107005 October 1996

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

An FCC Unit was shut down for 9 days following failure of the wet gas compressor turbine. Total loss was estimated at $4.65 million (£2,776,119) (1996). The loss was caused by water contaminating the lubricating oil of the turbine driver. Water had entered the lube oil system through a defective steam ejector system that is an auxiliary part of the wet gas compressor's steam turbine driver. The FCC wet gas compressor was installed in 1971 and had two, long operating periods (12 years and 11 years) without an incident. On September 27, 1996, a short-term lube oil bearing temperature increase of 15 degrees F on the inboard end of the turbine was followed with a 70 degrees F fall in lube oil temperature. This was possibly the first indication of some loss of bearing material, which resulted in an increase in the bearing clearances allowing more oil to flow into the bearings. This increased flow resulted in the reduction of the lube oil temperature below normal level. On September 28, a decline in the turbine exhaust vacuum was discovered. This was rectified by adjusting the sealing steam and the condenser ejector system. The decline in vacuum was probably due to the increase in bearing clearance the previous day causing some minor degradation of the turbine labyrinth seals. The turbine exhaust steam vacuum was steady throughout the remainder of the week, until Friday, October 4. Again the sealing steam had to be adjusted to maintain proper vacuum. Operations continued normally until the morning of October 5. At 05:50 hrs. a vibration alarm came on in the control room. Operator response to the turbine-compressor train found excessive vibration on the turbine. The sealing steam pressures were abnormal and the turbine exhaust vacuum had declined. Adjustments failed to correct the vibration problem or the turbine exhaust pressure. Increased vibration and "sparks" from the packing box area of the turbine resulted in the decision to shut down.

The FCC steam turbine driven wet gas compressor was shut down owing to extremely high vibration, sparking from the inboard and outboard packing box and a total loss of turbine performance. Inspections carried out afterward on the turbine and compressor found the following:

1. The radial bearings were excessively worn, all babbit was found removed and the rotor had operated on the bronze backing of the tilt pad bearings.
2. The shaft labyrinth seals were heavily damaged.
3. There was damage to the rotor blades at the 5th stage (severe) and on the 7th and 8th stages.
4. There was evidence of heavy rust in bearing housings and the oil lubricated coupling was fouled with rust and "blocked up."
5. The compressor itself was undamaged, but there was rust in the bearing housings and minor damage to thrust bearings.

Evidence of water contaminated lube oil throughout the system caused sludge and corrosion material build up in the bearings. The water came from a defective steam ejector system. Eight out of the 12 tubes of the gland condenser had failed; and since the condenser drain was plugged, it allowed the cooling water to flow back into the turbine seals and into the lube oil system.

The refinery took a number of corrective actions that included:

1. Repair of and modification to the ejector system.
2. Development of a proper lube oil monitoring system for all rotating equipment on site.
3. A review of other machine condition monitoring systems for bearings.
4. Development of a comprehensive training program including refresher training to ensure compressor - turbine auxiliary systems are fully understood.
5. Ensuring clear communications between operations and maintenance on the priority that should be given to monitoring and maintenance of critical equipment.

The immediate cause of the failure was the presence of water in the lubricating oil system which destroyed the ability of the lube oil to support the rotating equipment. The basic cause of the contamination was the leaking tubes on the associated with the auxiliary system ejector system combined with the plugged drain. In addition, the failure to identify and/or acknowledge a number of warning signals prior to the incident was also significant. The latter was attributed to training particularly the need for refresher training on the wet gas compressor's auxiliary systems.

[cracking, turbine, mechanical equipment failure, training inadequate, plant shutdown]

Lessons

1. Rotating equipment lubricating oil examination to detect contaminants to be a routine operation.
2. Use condition monitoring equipment to determine critical bearing performance, but be sensitive to other early warning signals.
3. Auxiliary systems are outside operations mainstream expected performance and so are easily overlooked. Refresher training is essential for these systems.

8472 03 October 1996

Source : PROCESS ENGINEERING, 1996, NOV,; EUROPEAN CHEMICAL NEWS, 1996, OCT, 7,; PRESS ASSOCIATION.
Location : Avonmouth, UK

Injured : 18 **Dead :** 0

Abstract

A series of explosions ripped through an epichlorohydrin storage tank when a road tanker was unloading sodium chlorite. Smoke drifted across the M4 and M5 motorways which were closed. Rail services were closed. The documentation for the tanker appeared to be incorrect.
[storage tanks, document errors]

Lessons

[None Reported]

8913 08 September 1996

Source : HAZARDOUS CARGO BULLETIN, 1997, JUL.
Location : North Carolina, USA

Injured : 0 **Dead :** 0

Abstract

A release of 132m3 of propane occurred during a delivery at a bulk storage facility. The incident occurred when during the unloading of a cargo tank into two 113m3 storage tanks, the discharge hose became separated from its coupling at the storage tank inlet connection. The driver shutdown the engine, stopping the discharge pump but could not access the remote closure control to close the internal stop valve.
The excess flow feature of the emergency discharge control system did not function and propane continued to be released from the system. In addition to this the back flow check valve on the storage tank system failed resulting in even greater loss.
[hose failure, spill]

Lessons

[None Reported]

1114125 August 1996

Source : ICHEME
Location : , USA

Injured : 0 **Dead :** 0

Abstract

An high pressure cooling water supply line ruptured necessitating reduced feed to the FCC. Water hammer shock coupled with bending stress is the likely cause of the failure which is estimated to have cost $88,000 (£52,700) (1996), of which $62,000 (£37,100) (1996) was production loss.
The line rupture was discovered when the general operator observed a temperature increase at the FCC second stage drum and sent the general operator to the cooling towers to investigate. When the operator arrived at the cooling tower to investigate the problem, he noticed that both high pressure fans were off and that a small trickle of water was accumulating in the roadway. The operator reset the vibration switches on both fans and attempted to restart them, but he was unsuccessful. After attempting to restart the fans, the operator noticed the pressure pump was also off. He was unable to restart it. By this time the flow of water in the roadway had grown substantially, so the operator began to investigate the source of the flow. Operators noticed that the flow of water returning to the cooling tower basin had significantly decreased and observed a loss in the cooling tower level. To maintain cooling and prevent damage to the low pressure cooling circuit, the high pressure cooling circuit was shut down and firewater was added to the basin. Over the next several hours, fire hoses were connected to heat exchangers in the high pressure cooling circuit to provide a temporary water supply. Once electricians were able to examine the equipment, they found that the 600 amp main electrical breaker 114 degrees C, supplying the high pressure pump and fan, had tripped. They also discovered that another fan had shut down due to vibration, unrelated to the circuit breaker tripping. Approximately half an hour after the main circuit breaker was reset, the high pressure pump started to run on its own, even though its switch was in the off position and it had to be shut off by opening its circuit breaker because it could not be shut off using its stop button. Circulation was re-established at 7:30 pm on August 27 after 64 hours.
After an investigation it was concluded that the immediate cause of the pipe fracture was probably due to water hammer combined with a high localised bending stress.
The basic cause was poor piping design and installation.
A contributory cause was probably faulty electrical equipment that caused a pump to trip off and restart automatically.
[design or procedure error]

Lessons

The following recommendations were made:
1. Water hammer even in large industrial systems can cause severe damage to weak points designed into a piping system.
2. Old electrical relay equipment requires significant preventive maintenance
attention if it is to continue to provide reliable service.

8389 21 August 1996

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Spill during the transfer of tank bottoms at a refinery.

During a planned transfer of tank bottoms from one tank to another, the hose attached to the pump outlet separated from its flanged connection, releasing a significant amount of tank bottoms. It was found that the non-return valve was fitted in the line the wrong way which created a pressure build-up and led to the hose separating from the flange. In addition, the equipment was not operated in the manner in which the designers and suppliers had intended, and there was no pressure relief in the system using positive displacement pump. The cause was due to the incomplete training of the labour crew since tank bottoming practice had changed requiring flanged fittings and assembly of reducers and a non-return valve onto the tank valve flanges. No training was provided on the set up and operation of the compressor/pump facility. Inadequate policies, procedures, evaluation of loss exposures, specification of design criteria, and evaluation of changes also contributed to this incident.

[material transfer, valve failure, refining]

Lessons

The scenario demonstrates clearly how one wrong item in a chain of events, i.e., the reverse fitting of an NRV led to the incident.

There are probably lessons that all sites can learn; essentially better communication and control of contractor operations.

9027 19 August 1996

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, AUG.
Location : Lancashire, UK

Injured : 0 **Dead :** 0

Abstract

An exothermic reaction caused a fire and subsequent spill from a distillation process vessel. The vessel contained 4000 kg of solvents used in paints and printing inks.
[fire - consequence]

Lessons

[None Reported]

8631 14 August 1996

Source : LLOYDS LIST, 1996, AUG, 17.
Location : , CROATIA

Injured : 2 **Dead :** 1

Abstract

A fire occurred at a refinery which was started at an oil pump but was extinguished after 18 minutes. Fatality.
[fire - consequence, refining]

Lessons

[None Reported]

8630 09 August 1996

Source : LLOYDS LIST, 1996, AUG, 13.
Location : , GREECE

Injured : 0 **Dead :** 0

Abstract

Loading of oil at a terminal resulted in a spillage when loading pipe ruptured during a storm.
The spillage of 300 tonnes of oil occurred when hose broke during routine unloading of marine tanker causing pollution. The company blamed the accident on the weather but they were fined $650,000 (1996) due to the vessel not being safely docked and delay in shutting off the loading valve. The master and first mate have been charged with causing the pollution and the refinery director and loading manager have also been indicted over the incident.
[weather effects]

Lessons

[None Reported]

8627 04 August 1996

Source : LLOYDS LIST, 1996, AUG, 5.
Location : , BULGARIA

Injured : 6 **Dead :** 3

Abstract

A fire occurred in a refinery which was caused by a leak in pipe. Fatality
[fire - consequence, refining]

Lessons

[None Reported]

8628 18 July 1996

Source : LLOYDS LIST, 1996, AUG, 9.
Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a refinery due to a failed flange and relief valve .
[flange failure, valve failure, fire - consequence, refining]

Lessons

[None Reported]

1243109 July 1996

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A sudden emission of some 33 tonness of hydrocarbon vapour from a floating roof crude tank occurred at a refinery. The release was caused by an uncontrolled heat input to the steam coils in the tank, which contained a mixture of crude oils and a considerable amount of wet process unit slops. This event was potentially catastrophic. When the cause of the emission was discovered, a full emergency response situation was declared, the tank was isolated from the steam supply and cooled to bring it back into a safe condition.

[gas / vapour release, floating roof tank, process causes, refining, design or procedure error]

Lessons

[None Reported]

8610 04 July 1996

Source : LLOYDS LIST, 1996, JUL, 6.
Location : Chechen, RUSSIA

Injured : 0 **Dead :** 0

Abstract

A huge fire occurred in a chemical plant which appeared to be spreading towards the refinery.
[fire - consequence, refining]

Lessons

[None Reported]

1035825 June 1996

Source : LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.
Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

One of two catalytic crackers was damaged due to an overpressurisation incident that ruptured some piping and damaged a waste heat boiler.
[damage to equipment, cracking]

Lessons

[None Reported]

8599 14 June 1996

Source : LLOYDS LIST, 1995, JUN, 17.
Location : Gothenberg, SWEDEN

Injured : 0 **Dead :** 0

Abstract

During the preparation for loading a tank container with ethylene diamine, the tank container overturned and landed on its side. Small leak found on the tank.

Lessons

[None Reported]

8609 14 June 1996

Source : LLOYDS LIST, 1996, JUL, 5.
Location : Samara Region, RUSSIA

Injured : 0 **Dead :** 0

Abstract

Oil in two settling tanks attached to pipeline caught fire.
[fire - consequence]

Lessons

[None Reported]

8463 07 June 1996

Source : EUROPEAN CHEMICAL NEWS, 1996, JUN, 17.
Location : Gelsenkirchen, GERMANY

Injured : 0 **Dead :** 0

Abstract

An explosion on No.3 cracker occurred during the start-up of the plant after unplanned maintenance.
[cracking]

Lessons

[None Reported]

1107903 June 1996

Source : ICHEME

Location : ,

Injured : **Dead :**

Abstract

Light ends from the FCC main fractionator were being recovered using a wet gas compressor. Two casing drains from this compressor had thinned through internal corrosion. Engineered box enclosures injected with special sealant had been installed to avoid an untimely shutdown of the compressor. Within 3 weeks of the temporary repair being installed, one of the box enclosures failed releasing high pressure hydrocarbon vapours to the atmosphere. Fortunately, there was no ignition but production losses amounted to $56,000 (£33,433 (1996)).

Inspection of the temporary enclosure device revealed that the strongback tongue had failed. The tongue (see Figure 6) is designed to hold the leak repair device in position during the sealant injection process and during operation. The tongue is a necessary part of the leak repair device since there exists an unequal axial thrust generated during the sealant injection operation. The tongue is also vital during normal operation because the unequal axial thrust remains after the sealant injection operation is completed. This is due to the physical characteristics of the sealant material that was used. The selected sealant for this application was a thermosetting type which exhibits the characteristic of very little or no shrinkage after hardening. Therefore, whatever forces are introduced into the box enclosure by the sealant injection including the enclosed piping and fittings themselves remains as long as the device is installed. These forces can be significant due to the high injection pressures typically applied during the sealant injection process. Typically, injection pressures are in the order of 1000 to 2000 psig. This pressure is exclusive of the static pressure necessary to create sealant flow rough the injection gun.

Representatives of the leak repair contractor responsible for the job were brought in to assist with the investigation into the incident. Both the leak repair contractor representative and a refinery engineer performed independent reviews of the leak repair device configuration, design calculations, material selection and design conditions used. The conclusion from both parties was that the box enclosure was properly designed. The box enclosure with the enclosed flange and piping still intact were sent back to the leak repair contractor's manufacturing facility for further inspection and testing. In addition, a full review of the installation procedure used for this specific application was carried out. According to the leak repair contractor#s design calculations for the tongue, an injection pressure of 1300 psig was used to calculate the generated hydraulic thrust. The allowable working load of the tongue was calculated and shown to be 1 1/2 times the hydraulic thrust thus indicating an acceptable design. However, the leak repair contractor#s review of the installation procedure used for this job revealed than an injection pressure of 2500 psig was inadvertently used for this application. Given this injection pressure, the generated hydraulic thrust due to sealant injection exceeded the allowable working load of the tongue by a factor of 1.3. The leak repair contractor representative also indicated that there was a sharp transition from the box enclosure to tongue. The excessive hydraulic thrust introduced during the sealant process, the minimal shrinkage characteristic of the type of sealant selected, in combination with a stress riser due to the sharp transition between the tongue and the box enclosure most likely resulted in a fatigue failure in the transition area. This was consistent with visual observations of the failure.

[mechanical equipment failure, gas / vapour release, competency lacking, cracking, pipe, drain]

Lessons

The justification for undertaking this type of temporary repair must be weighed against the potential consequences of failure. Such justifications should be endorsed by senior management on advice from a professional mechanical engineer. When there is justification for such a repair, all aspects of the job must be carefully examined, controlled and implemented by competent personnel.

The following corrective actions were taken:

1. The Leak Repair Contractor has reviewed the injection procedures and trained their technicians to ensure their understanding of the differences in injection mechanics associated with the various types of sealant. This will ensure that the correct sealant injection pressure is applied in future.
2. The Leak Repair Contractor's Engineering Department has reviewed high stress concentrations at the enclosure to tongue transition specifying a minimum radius.
3. Other similarly designed clamps installed have been inspected to ensure that a similar failure will not occur.
4. Inspection will continue to monitor the first and second stage drain piping at 6-month intervals or until a corrosion rate is established for each stage.

1036602 June 1996

Source : LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.
Location : West Bengal, INDIA

Injured : 0 **Dead :** 0

Abstract

364,000 litres of diesel spilt when a marine tanker's pipeline overflowed during loading operations on a jetty.
[spill, marine transport]

Lessons

[None Reported]

8605 02 June 1996

Source : LLOYDS LIST, 1996, JUN, 5, JUN, 6.
Location : , INDIA

Injured : 0 **Dead :** 0

Abstract

A river transportation incident. Spillage of several tonnes of petroleum products into water at jetty when oil barge overflowed her pipeline during loading operations. 358,000 litres of diesel spilt.

Lessons

[None Reported]

8459 25 May 1996

Source : EUROPEAN CHEMICAL NEWS, 1996, JUN, 3.
Location : Wisebaden, GERMANY

Injured : 0 **Dead :** 0

Abstract

A fire in a cooling tower spread to two adjoining towers causing damage estimated at $324,000 (1996).
[fire - consequence, damage to equipment]

Lessons

[None Reported]

8412 18 May 1996

Source : ICHEME
Location : ,
Injured : 0 **Dead :** 0

Abstract

Fuel gas release causes refinery plant shut-down. A contractor erroneously opened the body of a valve which was located in the live main fuel gas line beyond the battery limit. Hydrogen-rich gas escaped, and the refinery lost its fuel gas main pressure and all units had to be shut down. This resulted in product loss. It was found that the instruction that consultation should be carried out if any valve was to be opened was ignored.
The cause of this incident was that the work order did not specify the number and location of the valves to be checked and repaired. The valves were, apparently, not tagged. In addition, the work order had not been cleared.
[labelling incorrect, operator error, refining, plant shutdown]

Lessons

Work orders must be specific in job and location description.

1035717 May 1996

Source : LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.
Location : California, USA

Injured : **Dead :**

Abstract

A fire occurred on one of the coking drums at a 100,000 bpd refinery was under control in 2.5 hours and extinguished in 4 hours. Two coking drums on the 56,000 bpd coker were put out of service. The mutual aid support activated by the contingency plan from the public and industry fire brigades in the area was highly praised.
[fire - consequence, refining]

Lessons

[None Reported]

8413 14 May 1996

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A vacuum unit had been shut-down for a planned overhaul. Steam-out of the vacuum column was completed, with the top and bottom manway doors opened. Early the following morning glowing hot spots were noticed on the outside of the insulation at a level just above the bed. There was damage to equipment. It was found that an exothermic reaction of pyrophoric material ignited combustible material present. Several possibilities exist within the system that could produce iron oxide corrosion scale.
[maintenance, fire - consequence, cracking]

Lessons

Pyrophoric iron sulphide must ALWAYS be assumed to be present in CDU, VDU, FCC, Coker and Visbreaker fractionators.
No matter how good the steaming out procedure, all CDU, VDU, FCC, Coker and Visbreaker fractionators must be assumed to contain combustible material.

1035907 May 1996

Source : LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.
Location : Alabama, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred in the heat treating unit of the crude unit. Damage was minor.
[fire - consequence, distillation unit]

Lessons

[None Reported]

1035426 April 1996

Source : LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.
Location : Okinawa, JAPAN

Injured : 0 **Dead :** 0

Abstract

A fire occurred on a fuel oil desulphurisation plant of refinery
[fire - consequence, refining]

Lessons

[None Reported]

1035320 April 1996

Source : LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.
Location : California, USA

Injured : 0 **Dead :** 0

Abstract

A fire broke out when propane spilt into an enclosed refinery water system.
[fire - consequence, leak, spill, contamination, refining]

Lessons

[None Reported]

8398 06 April 1996

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Hydrotreater recycle hydrogen line failure at a refinery.

Localised corrosion of a FCCU (Fluid Catalytic Cracking Unit) feed hydrotreater recycle hydrogen line by-pass around a hydrogen pre-heat exchanger led to an explosion and fire. The failed part of the line had been identified by inspection as a dead leg. After investigation it was found that the mechanism of corrosion was ammonium chloride under deposit corrosion. The source of chloride has not been traced, but hydrogen from the catalytic reformer was strongly suspected. Inspection inadequate of the dead leg was identified as the cause of this incident. There was damage to equipment, material loss and product loss. [refining, fluid cracker]

Lessons

Localised corrosion mechanisms are difficult to detect with fixed point UT, and dead leg corrosion can have several different corrosion mechanisms.

516 01 April 1996

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

An explosion and fire occurred at a refinery. This was caused by pipe failure at the gasoline hydrometer unit. The pipe failure caused hydrocarbons to be released, which led to the explosion and fire which burned for more than three hours. No injuries were reported.
[fire - consequence, refining, vapour cloud explosion, mechanical equipment failure]

Lessons

[None Reported]

1035101 April 1996

Source : LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.
Location : Texas, USA

Injured : 3 **Dead :** 0

Abstract

An explosion occurred in a crude oil distillation unit, vapour compression room of a refinery.
[refining, pressure raising equipment, compressor, maintenance]

Lessons

[None Reported]

8582 15 March 1996

Source : LLOYDS LIST, 1996, MAR, 16.
Location : Paese, ITALY

Injured : 11 **Dead :** 1

Abstract

A road transportation incident. Two road tankers carrying butane burst into flames. A gas leak was spotted as 5 tankers were unloading into storage tanks. Schools and houses within 1 km radius evacuated. Fatality.
[evacuation, fire - consequence]

Lessons

[None Reported]

8705 11 March 1996

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1996.
Location : Bintulu, MALAYSIA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. Spillage of crude oil occurred following a hose line burst during loading. The accident occurred while the oil marine tanker was making fast to the terminal.

Lessons

[None Reported]

8392 09 March 1996

Source : ICHEME

Location : ,

Injured : 1 **Dead :** 0

Abstract

Shattered sightglass on desalter at a refinery. An operator noticed that the desalter pressure was dropping. When a unit operator went to check the desalter he found the north brine bullseye had shattered, and brine was spraying out under pressure. When recommissioning the north bullseye, after replacement, the south bullseye shattered. A near-by operator was scalded. There was damage to equipment. It was found that the glass disk material was of insufficient thickness to meet the pressure envelope and there had been erosion/corrosion of the glass face.

The glass disks had not been examined/replaced in accordance with manufacturer's guidelines, and there was no assurance that replacement disks were in compliance with material, toughening quality or process design specification.

[scalding, low pressure, spill, refining, gauge glass failure, injury]

Lessons

Clearly glass gauges should receive scheduled attention, since their failure can be catastrophic in terms of flying glass and released contents. Points to watch include the following:

1. Correct commissioning/decommissioning to avoid thermal/pressure shocks.
2. Use and upkeep of corrosion shields to protect the glass as required against some corrosive chemicals.
3. Incorporation of "blow out" protection such as balls within sight glasses, and maintenance of such protection guards as deemed necessary.

8286 05 March 1996

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.
Location : Amsterdam, NETHERLANDS

Injured : 2 **Dead :** 0

Abstract

A fire occurred in a laboratory when a reactor was charged with lithium aluminium hydride.
[fire - consequence, reactors and reaction equipment, laboratory work, charging reactor]

Lessons

[None Reported]

8391 19 February 1996

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Coker charge pump seal failure on a refinery. The inboard mechanical seal on a new Coker II Charge Pump failed. When coker feed was released, it auto-ignited.

The flange of the bellows, which is a sleeve made of Invar, had corroded away. The severity of the corrosion was a surprise since the seal had been in service only 6 weeks.

Losses including damage to equipment, product loss and the cost of maintenance amounted to $21,000 (1996). It was found that the flange of the bellows had corroded away and the seal stationary face separated from the bellows, allowing feed to leak to atmosphere. This was caused by the bellows material being susceptible to high temperature sulphur corrosion, however the engineering data sheet did not quantify the feed components, and the manufacturer had no data to quantify corrosion rates as a function of temperature and sulphur concentration.

[autoignition, material of construction failure, refining]

Lessons

Sulphur concentration needs to be stated on all seal and pump specifications.

8661 14 February 1996

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1996.
Location : Ludwigshaven, GERMANY

Injured : 25 **Dead :** 0

Abstract

50 kg of toxic gas escaped after an explosion in a drier.
The explosion cost DM 2m (1996) damage. A cloud of hydrochloric acid, sulphuric acid and chlorine was released and 25 workers were injured. The explosion was in a diaphragm process chlorine plant at the site. The cause was a blocked outlet for condensed water vapour from the hydrogen system of the plant. Plastic anti-corrosion material from the inside of the pipes is believed to have caused the blockage. Hydrogen was then forced back into the electrolytic cell and through its diaphragm into the chlorine system. The excess hydrogen reacted violently with the chlorine causing an explosion in the dryer section of the plant where chlorine is washed with sulphuric acid.
[gas / vapour release, heating, injury]

Lessons

[None Reported]

1160028 January 1996

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

A high pressure vent line from an ethanol unit was vented to flare, in an attempt to clear a suspected blockage in the line (hydrate formation) which contained a mainly ethylene stream, saturated with water vapour. An explosion occurred and a yellow column of flame was seen at the flare tip. The vent valves were immediately closed.
Minor damage was sustained and after an inspection of equipment and lines it was determined that the system should remain in operation with some additional nitrogen purging. The high pressure vent line was left isolated. It was determined that a more detailed inspection of the system should be carried out.
An enquiry team investigated the incident. It was concluded that an explosion had occurred in the flare knock out drum, but it was not possible to confirm the cause of the incident.
[damage to equipment, flow restriction, venting]

Lessons

1. A full inspection should be undertaken.
2. The design conditions of the high pressure vent line should be reviewed and the tracing requirements for the line should be confirmed.
3. The measuring and alarming of temperatures on the vent line should be undertaken.
4. Nitrogen purge flow requirements should be checked and a method of measuring the nitrogen flow to the flare should be identified.
5. A procedure should be prepared for depressurising the vent line, allowing for the low temperatures that could be seen.

1097126 January 1996

Source : ICHEME
Location : , GERMANY
Injured : 0 **Dead :** 0

Abstract

An incident at a fibre manufacturing plant.
Failure of an electrical supply to a conveyor system led to the incorrect charging of a reactor vessel. The failure was not noticed by the trainee operator until subsequent raw materials, including carbon disulphide, had been charged.
A local panel convened to investigate, and to recommend how to empty the vessel.
[electrical equipment failure, charging reactor, reactors and reaction equipment, plant / property / equipment]

Lessons

Re-draft of operating instructions.
Engineering measures to prevent incorrect charging sequence.
Upgrade of conveyor electrical supply.

8697 16 January 1996

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1996.
Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

Following a fire at a pump in the pipestill (distillation column) a hydroformer had also to be shut down.
[fire - consequence]

Lessons

[None Reported]

8567 09 January 1996

Source : LLOYDS LIST, 1996, JAN, 12.
Location : Vado Ligure, ITALY

Injured : 0 **Dead :** 0

Abstract

An explosion and fire occurred in a No. 33 shore tank at the petroleum terminal while marine tanker was unloading.
[fire - consequence]

Lessons

[None Reported]

8696 04 January 1996

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1996.
Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at refinery olefins unit.
[fire - consequence, refining]

Lessons

[None Reported]

8565 02 January 1996

Source : LLOYDS LIST, 1996, JAN, 5.
Location : Indianapolis, USA

Injured : 0 **Dead :** 0

Abstract

A flash fire broke out at a water purification plant but the incident did not affect production. The fire lasted 15 minutes.
[fire - consequence]

Lessons

[None Reported]

1115301 January 1996

Source : ICHEME
Location : , USA

Injured : 0 **Dead :** 0

Abstract

The feed effluent exchangers of a reformer suddenly caught fire. The fire was extinguished in 5 minutes and the unit safely shut down. The precise cause of the sudden fire is not known. An estimate of the total cost of the incident is $311,000 (£177,000) (1996), including $154,000 (£88,000) (1996) in production lost and $154,000 (£88,000) (1996) for labour and materials.

The FCC1 operator reported seeing smoke in the direction of the reformer. Upon arrival of operators and supervisors to the scene, the feed effluent exchangers were fully involved in fire. The fire was extinguished within about five minutes, and the unit was safely shut down. There were no injuries as the result of this incident. Due to liquid carryover to the DHT make-up gas knock out drum, both DHT compressors were shut down. The unit operator at the time of the incident stated that the he had just been in the area of the 4 exchangers, and that he had not observed leakage of products. Shortly after returning to the control room, he was informed that the exchangers were on fire. He estimated the elapsed time between walking through the area and being informed of the fire was approximately 5 minutes. He indicated that when he arrived at the scene, the most intense burning seemed to occur around the lower portion of the two stacked feed/effluent exchangers

The immediate cause of the fire was leaking reformer reactor effluent released to atmosphere above its auto-ignition temperature from either one of the bolted channel covers, channel head flanges, ring jointed piping connection or a threaded plug in the channel head cover.

The basic cause has not been determined, but seems likely to be either incorrect tightening of the heat exchanger covers, piping joints or threaded plug.

[fire - consequence, refining, heat exchanger]

Lessons

The following corrective actions were taken:

1. Although an improper tensioning procedure was an unlikely cause, it is recommended that in the future all assemblies requiring hydraulic bolting be supervised by technical personnel familiar with the procedures including lubricated studs and extensiometer readings to assure proper bolt tightening.
2. If possible, all threaded plugs in critical or corrosive services (elevated temperature, hydrogen, hot oil service, etc.) should be replaced with welded connections. At a minimum, a thread gauge must be used to assure proper thread engagement during turnarounds.
3. Consider installation of a water deluge system over the feed/effluent exchangers.
4. Consider fireproofing of cable trays in overhead pipe racks where damage occurred.

8406 1996

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

An explosion occurred when hot work was being carried out on the regenerator off-gas pressure reduction chamber. The chamber had recently undergone refractory repair.

It was found that the material used to repair the chamber produced hydrogen when water was added, which caused it to expand during application. The basic cause of this incident was that the Material Safety Data Sheet (MSDS) did not indicate that flammable gases would be given off during mixing.

[near miss, faulty instructions]

Lessons

When working with refractory materials, challenge suppliers if in doubt as to the composition of the materials being used.

8401 1996

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 1

Abstract

Fatality during maintenance on Fluid Catalytic Cracker Unit (FCCU) heat exchanger.
During steaming of heat exchanger shell covers, to facilitate removal, the lower cover blew off, striking an operator. The tight fit between the shell cover and floating head restricted the path of steam flow, creating an overpressurisation. This was due to the minimum clearance between the shell cover and floating head being less than that required by design.
[fluid cracker]

Lessons

When using steam for heating equipment for disassembly, a free path to vents must be available and maintained; e.g., not blocked by sludge.
Personnel need to be aware of the potential force of steam, nitrogen, air, used as a maintenance aid and not build up uncontrolled pressure in equipment.

8408 1996

Source : ICHEME
Location : ,
Injured : 0 **Dead :** 0

Abstract

Ice blockage in cooling water system. Due to a sudden change in weather conditions, the water flow into the intake was greatly restricted by an ice build up. There was a rapid decrease in the cooling water to the refinery. This resulted in damage to equipment and product loss. It was found that mud and zebra mussels had blocked the intake.
[cooling equipment, refining, cold weather, flow restriction]

Lessons

Rarely, but, sometimes, the causes of incidents can be attributed to nature e.g., flooding, storms, frost damage, plant growth - perhaps initiating further problems. Management should be aware of the possibilities and incorporate scenarios into their emergency plans.

124301996

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A 5500-m3 floating roof tank failed catastrophically during filling operations. The tank was being filled with water for the final water test subsequent to repairs. Fortunately no one was seriously injured.

The tank shell ruptured over the full height of the tank and the sudden release of about 5000-m3 water caused extensive material damage to pipework and 2 other tanks in the same bund.

An investigation into the incident found a tensile fracture " zip failure " due to thinning of the tank shell caused by corrosion. This corrosion was found as concentrated vertical grooves and pitting on the inside of the tank. Scratching by the rim seal brackets, fixed to the floating roof pontoons have contributed to the groove formation and "accelerated" corrosion of the tank shell. The absence of the so-called bumper bars on the floating roof pontoons allowed the brackets to touch the tank shell.

[tank failure, loading, damage to equipment]

Lessons

[None Reported]

8387 1996

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

The failure of a crude oil bypass line at a refinery. The crude oil bypass line on the CO1 exchangers on a crude unit failed, and there was a release of crude oil. There was damage to equipment. It was found that there had been severe localised chloride induced under deposit corrosion. Contributing to this was an incorrect unit throughput set point caused by an abnormal increase in line pressure. The area of failure was not easy to access/monitoring and in fact, the line had been leaking for a period of time prior to failure. There was a stagnant area, dead end between the isolation block valve and the main line (as it was not self draining), which allowed the build-up of crude sludge.

[refining]

Lessons

Corrosion to the point of failure in stagnant sections of pipelines is not always easy to detect at early stages and HAZOP and inspection procedures need to assess requirements.

Control limits on operating parameters may need to be fixed to avoid entering potentially hazardous zones in error.

8266 24 December 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 4, 1995.
Location : Pulau Merlinimau, SINGAPORE

Injured : 0 **Dead :** 0

Abstract

A fire occurred in the crude distillation unit due to a damaged gasket in a furnace.
[fire - consequence, damage to equipment]

Lessons

[None Reported]

8378 07 December 1995

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Incident at a refinery. A vent system on a sat gas debutanizer tower overhead line completely failed, releasing gas which formed a large vapour cloud. This incident was caused by mechanical fatigue from piping vibration with a large valve supported on the failed connection.
[gas / vapour release, mechanical equipment failure, refining]

Lessons

Pipe work, as installed, must comply with the design drawings, any changes being clearly indicated as having undergone established authorisation/review systems.

8211 28 November 1995

Source : LLOYDS LIST, 1995, NOV, 28.
Location : Cilacap, INDONESIA

Injured : 0 **Dead :** 0

Abstract

Lightning strike caused fire on 7 storage tanks of which at least 3 were completely destroyed. Tanks contained a variety of fuels. Production at refinery seriously affected. 2000 people evacuated.
[fire - consequence, evacuation, refining]

Lessons

[None Reported]

8232 24 November 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 4, 1995.
Location : Taipei, TAIWAN

Injured : 0 **Dead :** 0

Abstract

One of three operating crackers was shut-down following a fire and minor damage to two of the plants twelve furnaces.
[fire - consequence, damage to equipment, cracking]

Lessons

[None Reported]

8480 22 November 1995

Source : ENDS REPORT 263, 1996, DEC.
Location : North Yorkshire, UK

Injured : 0 **Dead :** 0

Abstract

A road transportation incident. A road tanker delivered 7 tonnes of 96% sulphuric acid which was unloaded into a tank of dioctyl phthalate. No violent reaction occurred but clean up operations were difficult.
[unloading, near miss, design or procedure error]

Lessons

[None Reported]

8262 16 November 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 4, 1995.
Location : South Killingholme, UK

Injured : 1 **Dead :** 0

Abstract

A fire broke out in a four storey catalytic cracker unit. 600 evacuated.
[fire - consequence, evacuation, cracking]

Lessons

[None Reported]

8207 24 October 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, DEC,; EUROPEAN CHEMICAL NEWS, 1995, OCT, 30.
Location : Ludwigshaven, GERMANY

Injured : 3 **Dead :** 1

Abstract

A river transportation incident. Explosion and fire occurred on inland waterways river tanker during discharge of 930 tonnes of methanol at plant. Fatality. [fire - consequence, unloading]

Lessons

[None Reported]

1760 20 October 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1995.
Location : Meraux, Louisiana, USA

Injured : 1 **Dead :** 0

Abstract

A fire occurred at the start-up of the refinery after a power supply failure.
[fire - consequence, refining]

Lessons

[None Reported]

8189 19 October 1995

Source : LLOYDS LIST, 1995, OCT, 19.
Location : , ST. LUCIA

Injured : 0 **Dead :** 0

Abstract

An oil spillage occurred during loading operations at a terminal.

Lessons

[None Reported]

8704 17 October 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1996.
Location : , KUWAIT

Injured : 0 **Dead :** 0

Abstract

One of two strings of hoses parted during loading of 350,000 dwt tanker. Up to 800 tonne crude oil spillage occurred.
[hose failure]

Lessons

[None Reported]

8204 17 October 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, DEC.
Location : Mina Al Ahmadi, KUWAIT

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. One of 2 strings of flexible hoses parted during loading of 350,000 dwt marine oil tanker at single buoy mooring. Spillage of 800 tonnes of oil.

Lessons

[None Reported]

8187 15 October 1995

Source : LLOYDS LIST, 1995, OCT, 16.
Location : Stenungsund, SWEDEN

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. A marine gas carrier overflowed into port when shore tank was overfilled and the overflow poured over the tanker deck. Only small amounts of water sludge with oil escaped. Spill.
[unloading]

Lessons

[None Reported]

8200 11 October 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, DEC.
Location : Manu St., Otahuhu, NEW ZEALAND

Injured : 50 **Dead :** 0

Abstract

Toxic fumes spread over the town and inhabitants urged to attend the hospital if feeling unwell. The explosion and fire occurred in a blender which was mixing azinphos-methyl, an insecticide which is an organic phosphate. Little water used to restrict runoff. 700 evacuated.
[fire - consequence, evacuation, gas / vapour release]

Lessons

[None Reported]

8259 03 October 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 4, 1995.
Location : Houston, Texas, USA

Injured : 0 **Dead :** 0

Abstract

A small fire at the refinery was extinguished and did not affect operations.
[fire - consequence, refining]

Lessons

[None Reported]

8373 01 October 1995

Source : ICHEME

Location : ,

Injured : 7 **Dead :** 0

Abstract

Fire at hydrofiner compressor on a refinery. During recommissioning, the west recycle gas compressor on a hydrofiner was overpressurised. The cylinder head was blown off, resulting in explosive decompression and fire. It was found that the discharge valve was installed in the wrong direction. The cause was the criticality of the task to replace the valve not being understood or reflected in procedures. Though the compressor was purchased to the standard of API 618, which
requires a design that prevent valves from being installed in the wrong direction, the equipment did not meet specification.
Production losses and repair costs were estimated at $500,000 (1995) (£318,300) and $400,000 (£254,600) (1995), respectively.
[fire - consequence, overpressurisation, installation inadequate, product loss]

Lessons

There have to be measures in place, as part of contractors' and suppliers' quality assurance programs, where critical issues on machines are identified and reviewed.

8703 30 September 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1996.
Location : Map La Phut, THAILAND

Injured : 0 **Dead :** 2

Abstract

A marine transportation incident. An explosion and fire occurred on board a chemical marine tanker during unloading of methanol. Fatality.
[fire - consequence]

Lessons

[None Reported]

8203 30 September 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, DEC.
Location : Map Ta Phut, THAILAND

Injured : 0 **Dead :** 2

Abstract

A marine transportation incident. An explosion and fire occurred on a marine chemical tanker during unloading of methanol at a pier. Fatality.

Lessons

[None Reported]

1795 30 September 1995

Source : LLOYDS LIST, 1996, JAN, 13.

Location : ,

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident involving a chemical tanker. An explosion and fire occurred on board while unloading methanol cargo. Constructive total loss. [fire - consequence]

Lessons

[None Reported]

8193 10 September 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, NOV.
Location : Brisbane, Queensland, AUSTRALIA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. Hose coupling on marine tanker failed during discharge at wharf during unloading. Small spillage of oil due to prompt shut down of pump.
[coupling failure]

Lessons

[None Reported]

8255 09 September 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 4, 1995.
Location : ,

Injured : 6 **Dead :** 0

Abstract

Incident started as a small local fire in the fluid catalytic cracker unit. Fire was attacked using a local monitor. Firewater was contaminated with gasoline which led to fire escallation.
[fire - consequence, contamination, cracking]

Lessons

[None Reported]

8182 September 1995

Source : LLOYDS LIST, 1995, SEP, 16,; HAZARDOUS CARGO BULLETIN, 1995, NOV.
Location : Saldanka Bay, SOUTH AFRICA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. 25,000 litres of crude oil spillage into harbour during unloading of marine oil tanker probably due to a burst pipe.

Lessons

[None Reported]

8241 25 August 1995

Source : LLOYDS LIST, 1995, DEC, 27.
Location : , SINGAPORE

Injured : 0 **Dead :** 0

Abstract

300 tonnes of oil spillage into the sea from the refinery when a valve on a pipe was left open after maintenance work.
[operator error, refining]

Lessons

[None Reported]

1926 25 August 1995

Source : LLOYDS LIST, 1995, 28 AUG.
Location : , SINGAPORE

Injured : 0 **Dead :** 0

Abstract

55 tonnes of heavy fuel oil spillage into the sea from a refinery pipeline leak.
[pollution, refining]

Lessons

[None Reported]

8174 23 August 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, OCT.
Location : Rotterdam, NETHERLANDS

Injured : 1 **Dead :** 1

Abstract

A marine transportation incident. A marine tanker barge loading at terminal was struck by ro-ro ferry and sank. 10 tonnes of naphtha spillage to canal from damaged hull. Small LPG spillage. Fatality.
[collision]

Lessons

[None Reported]

8168 20 August 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 3, 1995.
Location : Grozny, Chechen, RUSSIA

Injured : 0 **Dead :** 0

Abstract

An explosion at an oil refinery started a large fire. An investigation was started by the authorities to establish whether the explosion was caused by a deliberate act.
[refining]

Lessons

[None Reported]

6809 20 August 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 3, 1995.
Location : Port Arthur, Texas, USA

Injured : 0 **Dead :** 0

Abstract

A fire that occurred at a refinery was confined to a vent on a tank filled with hot coker feed in the refinery's tank farm. The fire, which lasted about one hour, had no impact on refinery operations. The refinery sells the coker feed to other refineries.
[fire - consequence, refining, storage tanks]

Lessons

[None Reported]

7844 13 August 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 3, 1995.
Location : Corpus Christi, Texas, USA

Injured : 0 **Dead :** 0

Abstract

The fire, which occurred in a vacuum unit of a refinery, caused the entire crude complex to be shut down for approx. 3 to 4 weeks. The fire itself burned for 3/4 hours. The vacuum tower that allows the crude unit to process heavier crude will remain down, and the refinery will shift to lighter crude.
[crude oil, fire - consequence, refining, separation equipment]

Lessons

[None Reported]

8165 10 August 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 3, 1995.
Location : Lisichansk, UKRAINE

Injured : 8 **Dead :** 1

Abstract

An explosion in an oil refinery knocked out the country's sole propylene production unit. The refinery continued to work. The refinery was shut down for the first five months of the year and annual capacity has now been reduced from 23 million tonnes to 16 million tonnes. It has processed a mere 680,000 tonnes so far this year.
[refining, fatality]

Lessons

[None Reported]

8172 10 August 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 3, 1995.
Location : La Chira, PERU

Injured : 0 **Dead :** 0

Abstract

Spillage of 18,000 gallons of oil occurred when unloading at a facility. Rough seas caused a hose to break loose during the unloading, resulting in an oil slick of 15 km. The shore line for approximately 13 km was affected.
[pollution, weather effects]

Lessons

[None Reported]

1160109 August 1995

Source : ICHEME
Location : , UK

Injured : 1 **Dead :** 0

Abstract

A driver/operator of a tanker being loaded with polyethylene pellets fell to the ground from the top of the tanker.
He sustained head and arm injuries.
During the loading of the tanker, the driver/operator had noticed that pellets were being spilled from the loading sock. He moved along the top of the tanker barrel to try and stop the spillage. He lost his balance and fell, after coming into contact with scaffolding. The tanker loading operation was halted.
The driver/operator was treated for his injuries at the scene, before being transferred to hospital.
An enquiry team investigated the incident.
[road tanker, fall, injury]

Lessons

1. Modifications to scaffolding in the loading area were recommended to prevent it from protruding beyond the fixed loading platform.
2. The requirement for some form of restraint to be provided on/near the tanker top to prevent falls, in the event that tanker ports have to be accessed (e.g. use of tankers with collapsible handrails; provision of a grab rail in the loading tunnel; harness and restraining cord provision across loading platform working areas).
3. Review of the frequency of first aid training.
4. Review of policy for calling a doctor and for transfers to hospital.

1887 06 August 1995

Source : LLOYDS LIST, 1995, AUG, 11, AUG 16.
Location : Conchan, La Chira, PERU

Injured : 0 **Dead :** 0

Abstract

Marine transportation. Hose on marine tanker broke during unloading of oil causing spillage of 18,000 gallons to sea. 13 km of shore line affected. [pollution]

Lessons

[None Reported]

8166 04 August 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 3, 1995.
Location : Baroda, Gujarat, INDIA

Injured : 0 **Dead :** 0

Abstract

Two storage tanks containing 5 million litres of gasoline were destroyed in a major fire. The fire was confined to the loading area and the refining operations were not affected.
[fire - consequence, damage to equipment, refining]

Lessons

[None Reported]

8167 02 August 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 3, 1995.
Location : Kurnell, Botany Bay, AUSTRALIA

Injured : 0 **Dead :** 0

Abstract

Following a power supply failure at the 110,000 barrel per day refinery, two out of four power plant boilers were shut down automatically in trying to cope with the overload. This resulted in black smoke coming from the boilers. Fire damaged the crude distillation unit and led to the shut down of the Fluid Catalytic Cracker Unit (FCCU). During the FCCU shut down, it too was damaged. Normal running was expected within seven days.
[fire - consequence, refining, damage to equipment, plant shutdown]

Lessons

[None Reported]

3467 24 July 1995

Source : LLOYDS LIST, 1995, JUL, 26.
Location : Texas City, Texas, USA

Injured : 0 **Dead :** 0

Abstract

Oil leaking from a catalytic cracker led to an explosion and fire. Interruption expected to last 13 days.
[fire - consequence, cracking]

Lessons

[None Reported]

8267 22 July 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 4, 1995.
Location : Westville, New Jersey, USA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. Strong winds caused marine tanker to move away from terminal during unloading operations. Flexible hose parted and spillage of 130 tonnes of crude oil occurred into the river causing pollution.

Lessons

[None Reported]

3499 22 July 1995

Source : LLOYDS LIST, 1995, JUL, 27.
Location : Tacoma, USA

Injured : 0 **Dead :** 0

Abstract

Three dust explosions in the nine story elevator during unloading.
[storage equipment, silo/hopper]

Lessons

[None Reported]

3256 16 July 1995

Source : LLOYDS LIST, 1995, JUL, 18, JUL, 25,; EUROPEAN CHEMICAL NEWS, 1995, JUL.; CHEMICAL HAZARDS IN INDUSTRY, 1995, DEC.
Location : Ludwigshaven, GERMANY

Injured : 4 **Dead :** 0

Abstract

Explosion in laboratory caused considerable damage when solvent leaked from a 250 litre vessel. Sulphuric acid accidentally entered a distillation vessel being used to purify an intermediate for making an animal feed additive. The acid caused a runaway reaction that shattered the glass column and escaping vapours caught fire.
[fire - consequence, laboratory work, damage to equipment]

Lessons

[None Reported]

8382 03 July 1995

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Sulphur pit explosion at a refinery. A flashback from the incinerator ignited an accumulation of acid gas in the sulphur pit. The cause of this accident was a previous modification to the sulphur pit design when the unit amine sump vent was connected into the sulphur pit vapour space. This allowed hydrogen sulphide to accumulate in the sulphur pit vapour space. The amine sump had originally been fitted with an atmospheric vent.
[near miss, design inadequate, refining, contamination, modification procedures inadequate]

Lessons

Allowing for understandable technical reasons, the contamination of the sulphur pit with drainings from the amine sump was undesirable, especially with the limited control over quantities being drained.

1779 01 July 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1995.
Location : Yaroslavl, RUSSIA

Injured : 1 **Dead :** 0

Abstract

A fire at an oil refinery probably occurred due to a spark during maintenance work. Three out of four LPG tanks were destroyed and the fourth was expected to burn out shortly after.
[fire - consequence, refining]

Lessons

[None Reported]

2643 29 June 1995

Source : LLOYDS LIST, 1995, JUN, 30,; HAZARDOUS CARGO BULLETIN, 1995, AUG.

Location : Clevedon, Avon, UK

Injured : 0 **Dead :** 0

Abstract

An explosion occurred when road tanker was unloading at chemical factory on industrial estate. Debris hurled into adjacent buildings site.
[unknown chemicals]

Lessons

[None Reported]

1589 26 June 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1995.
Location : Volga, RUSSIA

Injured : 0 **Dead :** 1

Abstract

A rail transportation incident. Loading of 3 rail tankers with butane and propane when there was an explosion. The blaze spread to 18 other rail tankers. Fatality.

Lessons

[None Reported]

3368 23 June 1995

Source : LLOYDS LIST, 1995, JUL, 1.
Location : Los Angeles, USA

Injured : 0 **Dead :** 0

Abstract

An explosion and fire occurred in a crude feeder causing power outage at a 68,000 barrel a day refinery.
[fire - consequence, power supply failure, refining]

Lessons

[None Reported]

8383 21 June 1995

Source : ICHEME
Location : ,

Injured : 0 **Dead :** 0

Abstract

A crude oil spill occurred at a jetty on a refinery. During an unloading operation, the marine loading arms' isolating ball valves were closed and the arms disconnected from the manifold of the
ship. As a result, approximately 20 tonnes of oil was spilled, some of it finding its way into the water. It was found that tradesmen had changed the printed circuit cards in the control box without having sufficient knowledge of the Marine Loading Arm Control System.
[environmental, refining,]

Lessons

Technical, detailed knowledge by tradesmen of refinery equipment can be much less than assumed and may lead to unwanted situations. Routine, e.g., annual reading and attesting to by signature of refinery safety regulations, operating instructions, maintenance regulations, etc. by those concerned is necessary.

8375 18 June 1995

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Residue hydrocracker fire. A 6 inch schedule 40, carbon steel elbow ruptured; and a fire resulted. It was found that the pipe failed due to erosion/corrosion. The cause was due to failure to apply management of change procedures to the decanted oil injection that identified erosion as a possible consequence of the decanted oil injection. No metallurgy upgrades or additional inspections were recommended as a result.
Loses $2.5 million (1995) (£1.59 million) (1995), including damage to equipment.
[fire - consequence, cracking, management system inadequate]

Lessons

The cumulative impact on the materials of construction from gradual changes in process conditions, e.g., flow rate, temperature, sulphur content, can, unfortunately, be overlooked if the threshold valves are not established to provide a base line for comparison.

2584 15 June 1995

Source : LLOYDS LIST, 1995, 20 JUN.; HAZARDOUS CARGO BULLETIN, 1995, AUG.

Location : Qua Iboe, NIGERIA

Injured : 0 **Dead :** 0

Abstract

A rupture occurred on a 42 inch diameter, loading pipeline on a terminal, causing shut down of the loading operations.

Lessons

[None Reported]

1173915 June 1995

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

A fire occurred on a mixer handling cellulose acetate and acetone. The cellulose acetate was in the form of waste produced during the process and was being recovered by adding to the acetone prior to charging fresh flake. This requires removal of the man lids on the charging chute. It is carried out under a positive pressure of inert gas and with vapour extraction. The fire was extinguished by refitting the man-lids and suffocating it.
The waste is in bale form and passes over a wetted earth-bonded roller prior to addition via the earth-bonded chute.
[fire - consequence, mixing]

Lessons

The investigation concluded that:
1. The cause of the incident was static discharge from inadequately discharged waste and oxygen from air entrained in the waste.
2. Under the then current operating procedure, avoidance of localised pockets of flammable vapour in the mixer could not be guaranteed.
3. The systems for discharge of static electricity were inadequate.
The main recommendations were:-
1. Improve the wetting of the waste as it enters the system in the short term.
2. Investigate an automatic waste addition system in the medium term.

8367 07 June 1995

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Oil spill at a dock at a refinery. During the transfer of lube oil back into the refinery for reprocessing, the discharge hose compression fitting at the flanged connection to the existing pipework failed, resulting in a major loss of oil containment. It was found that the hose, supplied by a third party, contained a fabrication defect. The cause was due to the failed fitting ferrule not being tight enough and the swaging dolly was too small.
[material transfer, refining, flange failure]

Lessons

If necessary to use hoses supplied by third parties, they should only be used when their history is known and the hose tested before use.

8365 June 1995

Source : ICHEME
Location : ,
Injured : 0 **Dead :** 0

Abstract

Drain line failure on catalytic reformer on a refinery. During the application of a temporary clamp over a pin-hole leak, a drain line from the level switch bridle on the catalytic reformer compressor dry drum failed catastrophically. There was a gas release; but it, fortunately, did not ignite. There was damage to equipment and product loss.
It was found that the wrong type of sleeve was fitted to the line, and that excessive tensile load was applied to line during injection of compound. The basic cause was that the sleeve was not approved prior to installation as required by procedure.
The procedures did not specifically address the possibility of over stressing from hydraulic effects.
[gas / vapour release, installation inadequate]

Lessons

The task of temporary repair to pipework using the "Furmanite" injection technique is a highly technical one which requires a sophisticated level of control to avoid disasters.

2997 13 May 1995

Source : LLOYDS LIST, 1995, JUN,; KNIGHT-RIDDER FINANCIAL NEWS

Location : Los Angeles, California, USA

Injured : 0 **Dead :** 0

Abstract

Explosion in coker plant at refinery during start-up after power outage caused shut down of all units.
[power supply failure, refining]

Lessons

[None Reported]

2497 13 May 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1995.
Location : Onitsha, NIGERIA

Injured : 0 **Dead :** 20

Abstract

A road tanker explosion while unloading LPG. The explosion caused a panic in the area in which several people were crushed by motorists fleeing the scene. Fatality.

Lessons

[None Reported]

1173811 May 1995

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

During discharge of solid flake from a bulk tanker, sparks were observed on the outside of the discharge flexible hose. The discharge was stopped immediately and the vehicle disconnected and sent away part discharged. There were no other consequences. The hose was translucent plastic with internal carbon steel wire armouring. Continuity had been lost between this and the metal coupling on the end of the hose. The hose had been supplied as having anti static properties but was not subject to regular continuity testing. This was because it belonged to the transport department and not the production plant. The SOP for the operation was also out of date, being for a "walking floor" type of vehicle. This had not been used for between 18 months and two years at this site. The operation had been carried out many times without incident.
The main recommendations were:
1. Procure two new anti-static hoses to be the property of the Plant.
2. Include earth continuity checks in the engineering department schedule.
3. Revise and re-issue the SOP.
4. Circulate Company guidance note on "Rules and Procedures for Sources of Ignition" to all relevant businesses in Group.
[unloading, road tanker, near miss]

Lessons

[None Reported]

8374 10 May 1995

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Isocracker explosion at a refinery. While pressure testing discharge valves on an out-of-service reciprocating compressor, 2100 psig process pressure blew out a gasket at the blinded flange in the system. A vapour cloud was released and subsequently ignited. It was found that the temporary compressor side blank failed due to pressure above its design capability. Operations personnel conducting the pressure testing were not familiar with the pressure limitations of the blind that was in place.

[vapour cloud explosion, overpressurisation, refining]

Lessons

Need to ensure that correct blinding is always used to meet the maximum pressure capability of the system. Need to ensure that Operations personnel are knowledgeable of the application limitations of various blinding systems which may be used.

2430 10 May 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 2, 1995.
Location : Toledo, Ohio, USA

Injured : 2 **Dead :** 0

Abstract

A new compressor on the isocracker unit of this refinery was destroyed by an explosion. The ensuing fire was rapidly extinguished. Damage was anticipated to require 6 months to repair although the unit was started within a month.
[fire - consequence, damage to equipment, catalytic cracker, refining, cracking]

Lessons

[None Reported]

8366 03 May 1995

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Crude distillation unit fire and shutdown at a refinery. Piping on the bottom of the desalter safety valve outlet header, adjacent to the crude tower, failed. Hot oil was released and ignited. There was damage to equipment and product loss.

It was found that hot oil corrosion along the bottom of safety valve discharge piping header led to failure of the piping. The basic cause was failure to identify the hazard presented by process conditions, both at the original design process and the subsequent review.

[fire - consequence, valve failure, spill, design or procedure error, refining, oil - hot]

Lessons

Design standards for pressure relief valve piping must take into consideration different process conditions (in this case, no flow).

1159727 April 1995

Source : ICHEME
Location : , UK
Injured : 2 **Dead :** 0

Abstract

One operator suffered a burned hand and two others were treated for shock, following a hydrocarbon fire at a chemical facility. A cracking furnace was being isolated, in preparation for de-coking and subsequent maintenance work, when the incident occurred.
The furnace was being isolated from the downstream process and the atmospheric vent valve opened. When the valve was fully opened, steam, as expected, was seen coming from the vent. Discoloured steam was then observed and a 'green distillate like material' was emitted from the atmospheric vent silencer. A 'bang' was heard and a fire was observed. The site emergency services were called.
The hydrocarbon fire burned itself out quickly, leaving small scaffolding fires on the furnace structure, which were dealt with by the emergency services.
Following the incident, it was identified that the block valve, which isolated the de-coking vent line from the cracked gas header, was passing. This allowed cracked gas and steam to enter the downstream pipework and de-coke drum, where steam and some hydrocarbon condensed. During normal operation, with the valve passing, a build up of liquids could have occurred.
The furnace was turned to atmosphere through this piping and steam flow lifted the liquids up and out of the atmospheric vent silencer. Liquids were ignited on the hot furnace surfaces.
Up to five tonnes of material was released in the incident.
[fire - consequence, burns, decommissioning, hot surface]

Lessons

1. The de-coking line should be positively isolated from the cracked gas header during normal operation.
2. Operating instructions for normal operation and for decommissioning should be updated in light of the incident. Operator training should also be reviewed.
3. Single line isolations, integrity of valves, locations of vents and valve operation should all be reviewed.
4. Review of the HSE's findings should be undertaken.

8155 27 April 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 2, 1995.
Location : Grangemouth, UK

Injured : 0 **Dead :** 0

Abstract

Explosion at the ethylene cracker which did not affect production.
[cracking]

Lessons

[None Reported]

1173626 April 1995

Source : ICHEME
Location : , UK

Injured : 3 **Dead :** 0

Abstract

Three staff were affected by fumes in two separate episodes on a site where NaHS tanker loading took place. In the first episode two gatehouse staff complained of lachrymatory fumes during the afternoon. On checking it was found that during NaHS tanker loading, the tanker vent scrubber pump was not running. It was restarted but the lachrymatory fumes persisted well beyond the 30 minutes required to load a tanker.
A second, related, episode occurred at 18:30 that evening. The night-duty man was affected by fumes. At 20:00 the fumes were gone but the man reported sick the following day with symptoms typical of H2S exposure.
It was later discovered that a catchpot on the NaHS plant was being drained at 18:30. The procedure was to use breathing apparatus and drain the pot until gas came out as the only indication that the pot was clear of liquid. The drain line was 2 inches in diameter and the system pressure was 5 psi. At one time the drain discharged below the surface of liquid containing bleach in a sump but following plant modifications this was no longer the case. The night-duty man's exposure was attributed to the puff of H2S released in this operation.
[hydrogen sulphide, gas / vapour release, pump failure, road tanker, draining, people]

Lessons

Actions proposed were:
1. Modify the catchpot sight glass to allow it to be drained while still leaving a few inches of liquid as a seal;
2. Modify the drain line to allow it to dip into the sump;
3. Carry out the HAZOP study of the NaHS plant due in June 1995.

2389 26 April 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1995.
Location : Chalmette, Louisiana, USA

Injured : 0 **Dead :** 0

Abstract

Fire on one of two crude oil units at this refinery caused by a spillage of 200 gallons. Production reduced for 1 day.
[fire - consequence, refining]

Lessons

[None Reported]

2411 26 April 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1995.
Location : Sri Racha, THAILAND

Injured : 0 **Dead :** 0

Abstract

A major tank fire was reported to result from a lightning strike at a refinery.
[fire - consequence, refining, storage tanks]

Lessons

[None Reported]

8390 23 April 1995

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Isocracker heat exchanger flange leak at a refinery. An Isocracker Unit was shutdown due to a small pinhole leak found in the first stage feed/effluent exchanger outlet piping. After disassembly of the piping system, the flange revealed extensive cracking.
Losses including damage to equipment, product loss, and materials and labour amounted to $1.3 million (1995). It was found that chloride stress corrosion cracking caused the incident. All four criteria for chloride stress corrosion cracking were present: Material of cracked flange was austenitic type stainless steel, known to be vulnerable to chloride cracking. Flanges were overcompressed and the joints had not been hydraulically torqued during previous turnaround. Even low overall concentration of chlorides got into grooves and pits during cycling and went undetected for many years/cycles.
[refining, cracking]

Lessons

Chloride stress corrosion cracking propagates during start-up and shutdown periods, even in low overall concentrations of chloride, concentrating in grooves and pits.

8091 21 April 1995

Source : CHEMICAL HAZARDS IN INDUSTRY, 1995, DEC.; FIRE ENGINEERING, 1995, DEC,; HAZARDOUS CARGO BULLETIN, 1995, JUN.
Location : Lodi, New Jersey, USA

Injured : 0 **Dead :** 5

Abstract

An explosion severely damaged a plant. Problems occurred when mixing 1000 lbs of aluminium powder and 8000 lbs of sodium hydrosulphite. When benzaldehyde was added, a pipe that fed the chemical clogged. Workers tried to clear the blockage with water and some reacted with the sodium hydrosulphite and caused the mixture to smoulder. Nitrogen was added to smother the reaction and some material was being drummed off when the explosion occurred.
[damage to equipment, processing, batch reaction, fatality]

Lessons

[None Reported]

2393 19 April 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1995.
Location : Houston, Texas, USA

Injured : 0 **Dead :** 0

Abstract

Fire on a fired heater feed loop at this refinery shut one of the four crude oil distillation units for 14 days.
[fire - consequence, refining]

Lessons

[None Reported]

8120 19 April 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, JUN.
Location : Houston, Texas, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a refinery which shutdown one of the crude distillation units.
[fire - consequence, refining, processing]

Lessons

[None Reported]

8115 06 April 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, JUN.
Location : Northwich, Norfolk, UK

Injured : 0 **Dead :** 0

Abstract

Spillage of 2 of 18 five litre containers of butoxy ethanol acetate and butyl glycol acetate during unloading at parcel station.

Lessons

[None Reported]

2420 04 April 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 2, 1995.
Location : Bourgas, Black Sea, BULGARIA

Injured : 1 **Dead :** 2

Abstract

Gas release from a pump on the catalytic cracking unit of this refinery. Fatality.
[catalytic cracker, gas / vapour release, refining]

Lessons

[None Reported]

2376 30 March 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 2, 1995.
Location : , SINGAPORE

Injured : 0 **Dead :** 0

Abstract

Fire broke out at the road loading terminal at this refinery. Fire controlled within 20 minutes.
[fire - consequence]

Lessons

[None Reported]

2249 11 March 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1995.
Location : Beaumont, Texas, USA

Injured : 0 **Dead :** 0

Abstract

Small fire occurred in the crude distillation unit at this refinery.
[fire - consequence, refining]

Lessons

[None Reported]

8101 08 March 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, MAY.
Location : Freeport, BAHAMAS

Injured : 0 **Dead :** 0

Abstract

A fire occurred after lightning struck diesel tank at oil refinery facility. Blaze extinguished after 2 days. Residents evacuated. Damage estimated at $7 million (1995).
[fire - consequence, damage to equipment, evacuation, refining]

Lessons

[None Reported]

8527 15 February 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, APR.; EUROPEAN CHEMICAL NEWS, 1995, FEB, 27.
Location : Essen, GERMANY

Injured : 4 **Dead :** 1

Abstract

An explosion and fire occurred at a chemical plant applying silicone coatings. The blast occurred when some polymethyl hydrogen siloxane was accidentally fed into a reactor, together with the correct feedstock, allyl glycidyl ether. The two epoxides reacted, overheated and hydrogen burst out of a ruptured pipe into the building, where it mixed with air and exploded. The 5 workers were caught in the resulting fire. According to the Company, the police believe that human error is to blame. Although both chemicals were labelled, they were stored in drums of the same colour. Damage is put at DM 10m $6.7m (1995). Fatality.
[fire - consequence, human causes, damage to equipment, identification inadequate, overheating, chemicals added incorrectly, charging reactor, reactors and reaction equipment]

Lessons

[None Reported]

8143 10 February 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.
Location : Kaduna, NIGERIA

Injured : 0 **Dead :** 0

Abstract

A small fire occurred at a refinery.
[fire - consequence, refining]

Lessons

[None Reported]

8504 07 February 1995

Source : LLOYDS LIST, 1995, FEB, 9.
Location : Perama, GREECE

Injured : 0 **Dead :** 0

Abstract

Transportation. Fire broke out when a fuel oil pipeline running from a storage tank to a loading terminal sprung a leak and ignited.
[storage tanks, fire - consequence]

Lessons

[None Reported]

1193725 January 1995

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

During discharging of a load of acetone from a tanker, the driver sat in the cab to have a cup of tea. The operator checked the discharge operation every 10 minutes (discharge normally takes 45 minutes). When the the tanker was empty, the discharge pump automatically shut down and the operator closed all the isolation valves, removed the wheel chocks and the earthing clip. The operator then opened the compound gates.
The operator stated that he then opened the cab door, told the driver that the tanker was discharged and only needed disconnecting. The operator stated that he noticed that the driver's eyes were closed but when he spoke the driver sat up and said "OK". The operator went to the rear of the tanker to wait for the driver to disconnect the hose but the driver started the engine and the tanker drove off.
The connecting hose stretched and broke before the driver realised that he had driven away without disconnecting it.
[unloading, road tanker, driver error, operation inadequate, spill]

Lessons

A review of the operating procedure for tanker discharging showed that disconnection of the hose had been omitted from the steps. The procedure also clearly stated that the driver should have carried out the opening and closing of the tanker discharge valve.
The available documents did not contain any recommendations but it is clear that the above deficiencies in the procedures and their applications would require to be addressed.

1193524 January 1995

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

An ignition of ethylene glycol vapour occurred in the headspace of a dye mixing tank. The tank lid was ejected on to the floor of the building. There was a small fire that was quickly extinguished. There were no injuries to personnel and no significant damage to plant.
The mixing tank was heated to 160 degrees C by hot oil coils. At this temperature the glycol in the vapour space is well above the upper flammable limit. However as the tank contents and temperature change during mixing operations, there are clearly times when the contents of the vapour space pass through the flammable range. The basis of safety therefore relied on exclusion of sources of ignition.
The explosion occurred as the level was being reduced. The investigation indicated that the ignition source was exothermic decomposition of the dyestuff on the exposed hot oil tubes. Charred residues were identified on the tubes.
[explosion, fire - consequence]

Lessons

The investigation identified that maintaining an atmosphere above the upper flammable limit is an unreliable basis for safety and that alternative means were required. It also identified that improved explosion vents were required.
The operating procedures should be changed to prevent hot oil being circulated through the coils when they are not covered by liquid.

8141 16 January 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.
Location : Melbourne, AUSTRALIA

Injured : 0 **Dead :** 0

Abstract

A fire arising from leak of crude oil from a nipple on crude distillation unit which failed following excessive pressure caused reduction by a third of refinery output.
[fire - consequence, processing, overpressurisation, high pressure]

Lessons

[None Reported]

8142 13 January 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.
Location : Rome, ITALY

Injured : 0 **Dead :** 0

Abstract

A fire broke out in refinery following a pump failure, causing damage to one of the columns. Output unaffected.
[fire - consequence, damage to equipment, refining, processing]

Lessons

[None Reported]

8395 02 January 1995

Source : ICHEME
Location : ,
Injured : 1 **Dead :** 0

Abstract

Separator explosion at a refinery. During bar screen raking (the first treatment step) to clean out any large debris which might have been filtered, an explosion occurred within the
enclosed bar screen vapour space. There was injury and damage to equipment. It was found that modifications made had created an explosive hazard, and a new inherent process hazard was not completely understood or managed.
[cleaning, fire - consequence, refining, modification procedures inadequate, injury]

Lessons

Process hazard analysis teams should be reminded to consider all modes of operation during a review. The rake operating procedure should have been considered when discussing the potential for oxygen entering the bar screen vapour space.
Some of the technical information supplied by the carbon canister vendor was found to have been misleading, and following the recommended procedures did not necessarily eliminate the inherent hazards. This affected the quality of the hazard analysis.

8359 January 1995

Source : ICHEME

Location : ,

Injured : 1 **Dead :** 0

Abstract

Asphalt release from blowing tower at a refining company.

An operations technician was burned by hot asphalt, released from a lifted rupture disc located at the top of the asphalt blowing drum. Overpressure in the blowing drum caused the rupture disc to lift and asphalt to be released. The basic cause was that the blown asphalt unit was operated outside designed operating parameters. In addition there was a lack of knowledge and inadequate written procedures which permitted abnormal operation and led to the malfunctioning of instrumentation and mechanical equipment.

[overpressurisation, instrumentation failure, mechanical equipment failure, design or procedure error, spill, refining, burns]

Lessons

Operators of asphalt (bitumen) blowing units need to have sufficient understanding of the chemistry of the process to appreciate what can result from changes in blowing air and the limitations of instrumentation.

8139 30 December 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.
Location : Suplacul de Barcau, ROMANIA

Injured : 0 **Dead :** 0

Abstract

An oil leak occurred during refinery processing led to spillage into a nearby river leading to downstream pollution as far as Hungary. Clean up hampered by adverse weather.
[processing, refining]

Lessons

[None Reported]

8138 30 December 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.
Location : Grozny, Chechnya, RUSSIA

Injured : 0 **Dead :** 0

Abstract

Serious damage to refinery due to war conditions with risk of fire spreading to 5,000 tonne ammonia storage tanks.
[fire - consequence, damage to equipment, refining, civil war]

Lessons

[None Reported]

8487 30 December 1994

Source : LLOYDS LIST, 1995, JAN, 4,; HAZARDOUS CARGO BULLETIN, 1995, MAR.
Location : Suplacui de Barcau, ROMANIA

Injured : 0 **Dead :** 0

Abstract

An oil spillage from a processing accident in the refinery caused pollution in a river also 57 km downstream.
[refining]

Lessons

[None Reported]

8545 23 December 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.
Location : Heerlen, NETHERLANDS

Injured : 0 **Dead :** 0

Abstract

A fire on one of two naphtha crackers reduced ethylene production by 40% for two weeks. The fire was brief but intense, following a release of naphtha, hydrogen and catalyst. Damage is estimated at US$570,000 (1994).
[fire - consequence, damage to equipment, cracking]

Lessons

[None Reported]

8532 19 December 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.
Location : Pont-de-Claix, FRANCE

Injured : 4 **Dead :** 0

Abstract

An explosion occurred within a distillation column of a protective coatings unit.

Lessons

[None Reported]

6791 18 December 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 4TH QUARTER, 1994.
Location : Martinez; California, USA

Injured : 0 **Dead :** 0

Abstract

Small fire in hydrocraker at a refinery resulting from gasket failure in lubricating oil system.
[fire - consequence, refining]

Lessons

[None Reported]

6784 06 December 1994

Source : LLOYDS LIST, 1994, 8 DEC.
Location : Jose Ignacio Terminal, URUGUAY

Injured : 0 **Dead :** 0

Abstract

Spillage of light crude oil during unloading from a marine tanker at a terminal.

Lessons

[None Reported]

6773 23 November 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1995, JAN.
Location : Fawley; Hampshire, UK

Injured : 0 **Dead :** 0

Abstract

Faulty coupling on loading arm at jetty caused spill of fuel oil.
[coupling failure]

Lessons

[None Reported]

8483 23 November 1994

Source : HAZARDOUS CARGO BULLETIN, 1995, JAN.
Location : Hampshire, UK

Injured : 0 **Dead :** 0

Abstract

A faulty coupling on loading arm at jetty caused small spill of fuel oil. Some beach pollution.
[coupling failure]

Lessons

[None Reported]

6764 14 November 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1995, JAN.
Location : Plock, POLAND

Injured : 0 **Dead :** 0

Abstract

Explosion and fire in refinery.
[fire - consequence, refining]

Lessons

[None Reported]

8544 14 November 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.
Location : Plock, POLAND

Injured : 0 **Dead :** 0

Abstract

Explosion and fire in 50 m high vessel at a 300,000 tpy naphtha cracker. Plastics production restricted. False readings on controls suspected after weekend power cut.
[fire - consequence, power supply failure, cracking]

Lessons

[None Reported]

6758 08 November 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 4TH QUARTER, 1994.
Location : Catlettsburg; Kentucky, USA

Injured : 0 **Dead :** 0

Abstract

Small fire in crude distillation unit.
[fire - consequence]

Lessons

[None Reported]

6749 01 November 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 4TH QUARTER, 1994.
Location : Maersk Guardian; Eckofisk, NORWAY

Injured : 0 **Dead :** 0

Abstract

Dust from tumble drier in the laundrette on an offshore rig caught fire and was drawn into ventilation system.
[fire - consequence, heating]

Lessons

[None Reported]

8356 November 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Compressor seal oil system malfunction at a refinery. The auxiliary seal oil pump started up while the primary seal oil pump was operating, resulting in abnormally high pressures and piping vibration. Seal oil was carried through the system and resulted in coking up of exchangers. Failure of pressure switch on auxiliary pump, inability to reset/ secure auxiliary pump, abnormally high pressures in system, excessive vibration in area piping, compressor tripped, seal oil tank level controller failed closed, seal oil carried through system via process stream. Absence of a feed divert or cut-out system in emergency, which would have prevented coke deposits in exchangers and other downstream vessels was the cause of this incident.
Product loss, $402,000 (1994), cost of maintenance, $50,000 (1994).
[refining]

Lessons

In this incident, the pressure switch began the chain of events leading to a considerable loss. Demonstrated here is the importance of evaluating ALL causes contributing to an event. In this case, evaluating causes associated with the seal oil carryover, led to discovery of a real susceptibility and provided opportunity to put controls in place to prevent considerable loss, whether the result of equipment failure (as was in this one incident) or the result of minor upsets.

8376 November 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Catalytic cracker vapour line deformation. During start-up of the reduced crude conversion unit (a heavy oil cracker), the reactor vapour line was heated up to a temperature sufficient to ignite coke in the line, resulting in overheating and deformation of the line. There was damage to equipment.
It was found that the line was heated beyond it's maximum capability. The cause was due to inadequate instructions, concerning operating limits, in the start-up procedure for the operators. In addition an air line heater outlet temperature indicator was not properly calibrated to read above the maximum allowable temperature.
[faulty instructions, cracking]

Lessons

Start-up procedures should include consequences of deviation as well as procedural steps to take to control temperatures and quench the reactor.

6744 28 October 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, OCT.; LLOYDS LIST, 1994, 31 OCT.
Location : Lake Charles; Louisiana, USA

Injured : 9 **Dead :** 1

Abstract

Explosion in fluid bed catalytic cracker during start-up operations after a one week repair. Fatality.
[cracking]

Lessons

[None Reported]

6717 04 October 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, OCT.
Location : Rastanura, SAUDI ARABIA

Injured : 0 **Dead :** 0

Abstract

Loading overpressured a wing tank on a marine tanker causing an oil spill.
[overpressurisation]

Lessons

[None Reported]

6713 01 October 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, NOV.
Location : Athens, GREECE

Injured : 0 **Dead :** 0

Abstract

Products marine tanker damaged pipeline after loading at a refinery. Causing a spill of 500 tonnes of oil into the sea.
[damage to equipment]

Lessons

[None Reported]

8427 October 1994

Source : HAZARDOUS CARGO BULLETIN, 1995, JUN.
Location : Norwich, UK

Injured : 0 **Dead :** 1

Abstract

A road transportation incident. A driver slipped and fell 12 feet from the walkway running along the top of the tank vehicle during fuel oil loading operations at a depot. The driver was taken to hospital but died nine days later from leg injury complications. The failure to install safety rails was the cause to this incident.
Fatality
[safety procedures inadequate, fall]

Lessons

Rails must be provided for top loading of tankers to prevent a person from falling off.

6708 27 September 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1994.
Location : Ciudad Madero, MEXICO

Injured : 0 **Dead :** 0

Abstract

An oil leak caused a small fire at this refinery. Substance gasoline.
[fire - consequence, refining]

Lessons

[None Reported]

6706 22 September 1994

Source : THE CHEMICAL ENGINEER, 1994, 27 OCT.
Location : Dunston, UK

Injured : 0 **Dead :** 0

Abstract

370 kg of ethyl acrylate and styrene vapour escaped to atmosphere. The accident was caused by the decomposition of a catalyst involved in a polymerisation reaction. The reactants, ethyl acrylate and styrene, and the catalyst were being dripped onto a reaction vessel full of hot xylene when fumes were noticed. At first it was thought the fumes were coming from the kettle until it was noticed they were coming from the overhead tank. The catalyst had started to decompose and the reaction was taking place there instead.
[gas / vapour release]

Lessons

[None Reported]

6703 21 September 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, OCT.; TASS, 1994, 21 SEP.; LLOYDS LIST, 1994, 22 SEP.
Location : Lisichansk, UKRAINE

Injured : 10 **Dead :** 3

Abstract

A blocked coil or pipe in a furnace caused 5 explosions and a large fire at this oil refinery. Fatality.
[fire - consequence, refining]

Lessons

[None Reported]

6700 16 September 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, OCT.
Location : Chao Phya River; Bangkok, THAILAND

Injured : 4 **Dead :** 1

Abstract

Explosion after pipe leaked during loading of ethyl alcohol to a marine tanker. Lighter destroyed. Fatality.

Lessons

[None Reported]

6688 07 September 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1994.
Location : Ellesmere Port, UK

Injured : 0 **Dead :** 0

Abstract

Dowtherm escaped from a leaking flange in heating equipment on a dye plant. No damage.
[spill]

Lessons

[None Reported]

6677 25 August 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1994.
Location : Grangemouth, UK

Injured : 0 **Dead :** 0

Abstract

At 05.00 hrs. on April 8, 1994, a leak on the main fractionator column of this crude distillation unit at a refinery resulted in a fire and shutdown of the unit.
At the time of the incident the unit was in the process of starting up after a short shutdown. Feed had previously been removed from the unit at 02.00 hrs. on April 5 and the unit put on warm circulation. This was to repair leaking tubes in the kero/stabilizer feed exchangers. Since the shut-down was as the result of a conscious decision to carry out maintenance work, temperatures were reduced relatively slowly when the unit was taken off-stream. Similarly, during the start-up process temperatures were brought up again relatively slowly. At the time of the incident the unit had just been streamed, with base stripping steam in commission, and the fired heater almost up to normal operating temperature.
Taken from data in the PI computer system, it appears that conditions in the column were steady before the incident. The only difficulty reported by the operator was difficulty picking up flow on the bottom pump-around, which was confirmed by PI data which showed irregular flow through the flow controller. Two peaks of large flow (for this stage of the start-up) were indicated at 05.10 and 05.13 hrs., close to the time of the incident. At 05.10 hrs. the temperature of the pump-around was 15 degrees C, rising to 50 degrees C over the next few minutes. The majority of the material entering the column at this time would have been around 15 degrees C. The temperature of that section of the column was 267 degrees C. Operators reported that irregular flow from the bottom pump-around is not unusual.
A few minutes before the incident, when checking the repaired kero exchangers, an operator noticed a cloud of vapour coming from the direction the main fractionator. Initially he thought it was a steam leak, but on investigation, suspected it was hydrocarbon vapour. As he moved to further investigate, the vapour ignited. The operator immediately informed the operator, who activated the plant Emergency Shutdown System (ESD), and contacted the fire service.
The seat of the fire was at the location of nozzles N7, 8, 15, and 15A, located at platform 9 of the column.
An inquiry found that the operators were following normal start-up procedures; and that, from log books, it appears that the correct sequence of actions was followed. The PIB (Plant Inspection Branch) report indicates that the vapour leak probably came initially from the 6 inch blanked nozzle N8, as indicated by fire markings on the column, supported by the fact that the flange showed significant leakage when tested subsequent to the incident, with the column under a nitrogen blanket. Another flange, N7, also showed slight leakage; but this could have been caused by radiant heat from the fire at the N8 flange. PIB confirm that the materials used for the flange joints were suitable for the duty, and that the gaskets and bolts appeared to have been correctly fitted.
During inspection of the main fractionator column, the inquiry team noticed that redundant HGO pipework was not adequately supported; e.g., one of the HGO lines which terminates at a block valve at platform 8 (the level below the fire) was lashed with wire to the platform above and further supported by a block of wood resting on platform 8. It is believed that the fire caused the lashing to relax; and the additional weight of the pipework on to platform 8 caused, or contributed to, the platform distortion which occurred.
[fire - consequence, flange, nozzle, material of construction failure, leak, gas / vapour release, start-up]

Lessons

Recommendations:
1. Operating procedures for the unit start-up should be amended, to minimize fluctuations of flow during the initial introduction of cold material from the bottom pump-around system.
2. Refinery guidelines should be issued regarding routine checking of flanges (particularly those at high level) during normal operation and unit start-ups. Checks to be recorded.
3. The refinery should review their present capability to deal with high level fires and the risk represented, and determine whether facilities should be upgraded.
4. Redundant HGO pipework on the unit should be properly supported.
Lessons:
The incident also demonstrated the difficulties in fighting fires located at an elevated location on processing units, with the need for pre-planning on simulated fire situations to assess adequacy of fire fighting equipment, fixed and mobile.
Processing plant operating procedures should be the subject of regular review to ensure that thermal shocks to equipment are minimized at every point in procedures.
Redundant equipment/pipework on plant is best removed completely; if not, it must be adequately supported.
Operator routine walks through plants should include checking for flange leaks, especially during condition changes, also during dramatic weather condition changes; e.g., heavy rain may produce thermal stress on hot flanges sufficient to cause relaxation.

6674 22 August 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1994.
Location : Martinez; California, USA

Injured : 1 **Dead :** 0

Abstract

Fire at refinery. Substance heavy oil.
[fire - consequence, refining]

Lessons

[None Reported]

6673 19 August 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1994.
Location : Bakersfield; California, USA

Injured : 0 **Dead :** 0

Abstract

Small fire on hydrocracker.
[fire - consequence, cracking]

Lessons

[None Reported]

6671 19 August 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1994.
Location : Houston; Texas, USA

Injured : 0 **Dead :** 0

Abstract

A runaway reaction led to a ruptured bursting disc and venting of about 2 tonnes of cyclopentadiene and fish oil. The vapour cloud ignited but was extinguished by plant personnel.
[fire - consequence]

Lessons

[None Reported]

6668 18 August 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, OCT.; LLOYDS LIST, 1994, 20 AUG.
Location : Priola, ITALY

Injured : 0 **Dead :** 0

Abstract

Ruptured pipes in one report but leaking ducts in another, on ethylene catalytic cracker plant caused small explosion and fire.
[fire - consequence, cracking]

Lessons

[None Reported]

7519 15 August 1994

Source : LOSS PREVENTION BULLETIN, 123, 13-14.
Location : ,

Injured : 1 **Dead :** 0

Abstract

When heating synthetic tar in a portable kettle to repair the roof of a maintenance shop. A worker draining tar from the kettle into a bucket noticed that the surface of the tar had caught fire in the bucket. As he moved backward, the handle stuck to his glove and the bucket tipped over, spilling the burning tar on the ground. The tap on the kettle did not close as designed, allowing additional hot tar to drain and causing the fire to spread. The fire engulfed the tar kettle trailer and an adjacent utility trailer that held a 100 litre liquefied petroleum gas (LPG) cylinder. When the LPG cylinder exploded, the end cap was hurled about 40 metres, causing a small grass fire. A second LPG cylinder in the vicinity vented but did not explode. One worker sustained first degree burns to his forearm from splattered tar. The site fire crew were called to the scene to extinguish the fire. Damage amounted to the total loss of the tar kettle, the adjacent utility trailer, and the two 100 litre LPG cylinders.
[explosion, fire - consequence, damage to equipment]

Lessons

The following steps should be taken to prevent or control fires associated with roof fires.
1. Identify and communicate all potential hazards before work begins.
This process is particularly important when unseen hazards exist, such as the presence of flammable vapours. Precautions to ensure that materials do not reach their flashpoints should be planned and executed. All required thermometers, thermostats, and other safety devices for heating equipment should be routinely inspected by qualified personnel.
2. Control hazardous materials on the job site.
This should include co-ordination of concurrent work so that hazards are recognised and minimised. Ensure that nearby workers are not exposed to hazards.
3. Develop fire protection plans that will minimise the potential for roof fires and ensure their control.
4. Plans for responding to potential roof fires should include controlling a fire to prevent its spread to other areas.

6659 09 August 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, OCT.
Location : My Lio; Thu Duc, VIETNAM

Injured : 2 **Dead :** 5

Abstract

Explosion in engine room of a marine tanker while unloading gasoline. Fatality.

Lessons

[None Reported]

6657 08 August 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, OCT.; EUROPEAN CHEMICAL NEWS, 1994, 15 AUG.; LLOYDS LIST, 1994, 17 AUG., & 20 AUG.

Location : Baton Rouge; Louisiana, USA

Injured : 7 **Dead :** 0

Abstract

Explosion and fire in ethylene catalytic cracker unit at chemical plant burnt for 3 days.
[fire - consequence, cracking]

Lessons

[None Reported]

6654 04 August 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, OCT.; LLOYDS LIST, 1994, 12 AUG.
Location : Mina Al Ahmadi, KUWAIT

Injured : 0 **Dead :** 0

Abstract

A leakage of gases caused fire in desulphurisation unit of refinery. Ignition reported as being due to a short circuit.
[refining]

Lessons

[None Reported]

6652 02 August 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1994.
Location : Philadelphia; Pennyslvania, USA

Injured : 0 **Dead :** 0

Abstract

3 alarm fire at refinery in the reformer unit where gasoline is boosted in octane.
[fire - consequence, refining]

Lessons

[None Reported]

8348 August 1994

Source : ICHEME
Location : ,
Injured : 0 **Dead :** 0

Abstract

Fire at crude unit pump on a refinery. During flushing of the coil in a cooler box, a coupling associated with a temporary pump installation, failed, and resulted in release of LGO. A fire started before any action could be taken to stop the release. There was damage to equipment and product loss. It was found that previous attempts to use the pump had resulted in failure, these were repaired but not reported. The cause was the pump being run beyond its design capabilities. In addition the maintenance leader had no intimate knowledge of the equipment to be used consequently inadequate instruction was provided, suppliers were aware that this equipment had not been used on this duty before on a "live" process unit; but they did not discuss this aspect.
[coupling failure, design or procedure error, fire - consequence, refining, temporary equipment]

Lessons

Use of temporary equipment (such as pumps) needs careful consideration and approval as to its design, suitability, and any risk it could present as a potential ignition source.

6647 28 July 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1994.
Location : Grangemouth; Stirlingshire, UK

Injured : 0 **Dead :** 0

Abstract

Fire in the crude distillation unit at a refinery caused a plant shutdown for 10 days. Substance crude oil.

Lessons

[None Reported]

1119828 July 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A fire broke out on a crude oil distillation unit at a refinery. A release of crude oil had occurred during maintenance work on a desalter, and the oil is thought to have ignited from an adjacent furnace.

The site emergency services were quickly at the scene and the fire was extinguished by 15:55 hours. There were no injuries sustained. Damage was confined to cabling and instrumentation, the unit being shut down with an estimated start-up date of early August.

During previous shifts the relief valves (RV) on the desalter unit were being prepared for on-line testing. The desalter is fitted with two 100 percent capacity RVs, one of which is in service at a time. The procedure on the 28th required changeover of the in-service RV and verification of the integrity of both the RV isolation valves and the balanced bellows unit integral to each RV. The equipment is located on an elevated platform at about 50 feet above grade. The RVs are designed to handle hot crude feed relief from the desalters (operating conditions approximately 9.5 barg and 140 degrees C) to the unit main fractionator column. In the process of isolation valve integrity checks, a hose was fitted to a three quarter inch drain point and led to a drain at ground level.

During the work an isolation valve was opened while the drain valve was 25 percent open, and the desalter began to discharge liquid to drain. Because the exit point of the hose was not visible from the platform, the discharge was not detected by those involved. The liquid discharge formed a pool and a flammable vapour cloud developed. The vapour cloud ignited, with a flash fire, followed by a pool fire. Calculations based on pool size and the distance from the release point to the lower flammable limit of the cloud indicated that the most likely source of ignition was from the crude oil charge furnace. The hose burned back to the drain point on the elevated platform resulting, in a torch fire at the drain point, it was, however, fortunate that the torch was directed into space and did not impinge on equipment.

The ground fire was extinguished within 12 minutes. The strategy adopted towards the torch fire was to cool adjacent equipment and remove the feed to the fire. This was accomplished, and the fire extinguished within 22 minutes.

[fire - consequence, hot surface, spill, damage to equipment, design or procedure error]

Lessons

The following recommendations were made:

1. It is essential that when equipment/plant of any type is opened up, i.e., containment broken, that adequate measures are taken to prevent unwanted release of contents from associated parts of the system.
2. Measures to include not only adequate work procedures, but also monitoring of site conditions throughout the work by "responsible" personnel.
3. When draining vessels to open drains the outlet point from drain hoses should be within view of those involved in the operation.

6641 24 July 1994

Source : LLOYDS LIST, 1994, 25 JUL., 26 JUL., 27 JUL., 28 JUL., & 30 JUL.; THE GUARDIAN, 1994, 25 & 26 JUL.; OIL AND GAS JOURNAL; 1994, 1 AUG.; THE CHEMICAL ENGINEER, 1994, 11 AUG.; PROCESS ENGINEERING, 1994, OCT.; THE EXPLOSION AND FIRE AT THE TEXACO REFINERY..., HEALTH AND SAFETY EXECUTIVE, 1997, ISBN 0717614131,; LOSS PREVENTION BULLETIN, 138, 3-10.

Location : Milford Haven; Dyfed, UK

Injured : 26 **Dead :** 0

Abstract

On Sunday 24 July at 13:23 an explosion, followed by a number of fires, occurred at a cracking plant on a refinery. The series of the events that led to the explosion can be traced to a severe electrical storm prior to 9:00 am, which caused plant disturbances which affected the vacuum distillation, alkylation, and butamer units as well as the Fluid Catalytic Cracker Unit (FCCU). A fire resulted from a lightening strike in the crude distillation unit that provided feed to the cracking units. This unit was then shut down, with all but the FCCU being shut down during the remainder of the morning. However, the direct cause of the explosion that occurred some five hours later was a combination of failures in management, equipment and control systems during the plant upset. These led to the release of about 20 tonnes of flammable hydrocarbons from the outlet pipe of the flare knock-out drum of the FCCU. The explosion caused a major hydrocarbon fire at the flare drum outlet itself and a number of secondary fires. The company emergency response team and the county fire brigade effectively contained these fires and prevented escalation by cooling nearby vessels that contained flammable liquids. Fires were allowed to burn, under the supervision of the fire brigade, for over forty eight hours. This being the safest course of action as the flare relief system had been incapacitated by the explosion.

The incident was caused by flammable hydrocarbon liquid being continuously pumped into a process vessel that had its outlet closed. The only means of escape for this hydrocarbon once the vessel was full was through the pressure relief system and then to the flare line. The flare system was not designed to cope with this excursion from normal operation and failed at an outlet pipe. The outlet pipe was known to be corroded, however the investigation concluded that as the line was not designed for liquid transfer, and as such would most probably have failed regardless of condition. This released 20 tonnes of a mixture of hydrocarbon liquid and vapour which subsequently exploded.

The situation was caused by a combination of events, including:

1. a control valve being shut when the control system indicated it was open;
   - This was due to poor control room displays.
2. a which had been carried out without assessing all the consequences;
   - The knock-out drum was altered from pumping to slops automatically, to recycle and manual pumping to slops. This modification was carried out for environmental and efficiency reasons, and had the effect of altering an automatic plant protection system to a manual system.
3. control panel graphics that did not provide necessary process overviews;
   - Again due to poor control room displays, and poor alarm management.
4. attempts were made to keep the unit running when it should have been shut down.

[gas / vapour release, spill, management system inadequate]

Lessons

The official report makes 14 recommendations which are split into five headings:

Safety management systems

1. Safety management systems should include means of storing, retrieving and reviewing incident information from the history of similar plants.
2. Safety management systems should have a component that monitors their own effectiveness.

Human factors

3. Display systems should be configured to provide an overview of the condition of the process including, where appropriate, mass and volumetric balance summaries.
4. Operators should know how to carry out simple volumetric and mass balance checks whenever level or flow problems are experienced within a unit.
5. The training of staff should include:

(a) assessment of their knowledge and competence for their actual operational roles under high stress conditions;

(b) clear guidance on when to initiate controlled or emergency shutdowns, and how to manage unplanned events including working effectively under the stress of an incident.

Plant design

6. The use and configuration of alarms should be such that:

safety critical alarms, including those for flare systems, are distinguishable from other operational alarms; alarms are limited to the number that an operator can effectively monitor; and ultimate plant safety should not rely on operator response to a control system alarm.

7. Safety-critical plant elements on which the safety of a process relies, ie whose failure could lead to hazardous events, should be identified. Any safety system used to protect against hazardous events should be specified, and subsequently designed, based on an appropriate hazard and risk analysis so that the functions to be carried out and the necessary level of integrity are systematically determined.
8. In new build, or re-equipment, projects and in reviews of existing plant layouts, a risk assessment should be carried out with regard to the location, and suitability of construction, of buildings and plant.
9. In processes that employ a flare system, there should be effective arrangements for the removal of slops from a flare knock-out drum that ensure that the removal is promptly initiated and at an adequate rate to prevent overfilling the drum.

Plant modification

10. There should be a formal, controlled procedure for hazard identification and operability analysis for modifications (including emergency modifications) that ensures that all safety issues identified at the design stage are reflected in how the modification is constructed and used.

Inspection systems

11. All safety critical parts of plant should be included by companies in comprehensive inspection programmes.
12. Inspection programmes for corrosion should err on the side of caution, with regard to the number and location of measurement sample points, concentrating on measurement sample points where greater (or less uniform) metal loss is foreseeable.
13. All foreseeable operational conditions, not just pressure, should be taken into account when setting the minimum acceptable thickness for pipe and vessel walls.

Emergency planning

14. Fire brigades, in consultation with appropriate major hazard installations, would be wise to look at emergency plans particularly in respect of the availability of adequate water supplies for fire-fighting and vessel cooling, to deal with the worst case scenario.

6638 20 July 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1994.
Location : Borger; Texas, USA

Injured : 0 **Dead :** 0

Abstract

Fire in desulphurisation unit of a refinery.
[fire - consequence, refining]

Lessons

[None Reported]

9393 15 July 1994

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

A blockage of approximately one tonne of fused polymer occurred in the cutter hood, pellet slurry pot, and associated pipework of an extruder. The overall coast of the incident, mainly loss of production, was estimated £40,000 (1994).
The pelleter speed had dropped (or stopped) due to a fault in the pelleter speed drive. The low pelleter speed alarm/trip had been disabled and bypassed.
[extrusion, plant / property / equipment]

Lessons

1. Changes to the plant were made without proper authority.
2. No permit to work was raised for bypassing the pelleter low speed trip. The speed sensor was also bypassed.
3. Not all personnel were aware of implications of these bypass operations.
4. Stress present due to multiple tasks
5. Recommendations were made and procedures put in place to address all these findings.

6619 06 July 1994

Source : ENDS REPORT, 1994, AUG.
Location : Runcorn; Merseyside, UK

Injured : 0 **Dead :** 0

Abstract

Substantial leak of vinyl chloride monomer (VCM) occurred during the unloading of a road tanker. A vapour lock in the coupling arrangement interupted the unloading and the operator opened a valve to release the blockage. The valve was not closed once the vapour lock was cleared and the release continued for an hour. 5 tonnes of VCM released.
[gas / vapour release]

Lessons

[None Reported]

6613 July 1994

Source : CHEMISTRY IN BRITAIN, 1994, DEC.; ENDS REPORT, 1994, AUG.
Location : Warrington, UK

Injured : 0 **Dead :** 0

Abstract

1.2 tonnes of vinyl chloride monomer (VCM) released due to operator misinterpreting computer data during polymerisation.
[operator error, pollution, gas / vapour release]

Lessons

[None Reported]

8345 July 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 1

Abstract

Electrical power supply failure and near miss at a refinery.
While replacing a fuse in the administration/laboratory building, an electrician caused a short circuit on a live system. There was power loss to the building and interruptions to lab operations. It was found that the relevant code and company procedures were not followed, and the switchgear was not isolated. The cause was lack of procedure and non-compliance even though it was established that the electrician had both adequate knowledge and adequate skill to complete the task.
[design or procedure error, refining, fatality]

Lessons

Even with well trained craftsmen, job task observation on a regular basis is essential to ensure that bad practices do not creep in.
Shortcuts in carrying out work on electrical equipment must not be tolerated; electrical isolation procedures must be followed, and it is essential to include all site buildings within the scope of the site permit/electrical work authorisation system.

8312 July 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a crude unit desalter at a refinery. During maintenance work on a desalter, there was a release of crude oil and a subsequent fire. There was damage to equipment and product loss. After investigation it was found that the isolation valve was open while the drain valve was 25 percent open, the discharge of liquid could not be seen and was, therefore, not detected.
[fire - consequence, spill, refining]

Lessons

It is essential that when equipment/plant of any type is opened up, i.e., containment broken, that adequate measures are taken to prevent unwanted release of contents from associated parts of the system.

8350 July 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Fouling in vacuum distillation unit at a refinery. Excessive build-up of fouling material in the top pumparound circuit forced an unscheduled shutdown. Fouling was found in the top pumparound circuit.

The most likely cause of this incident involved a series of circumstances leading to the processing of a feedstock containing unsaturated gas oils, more susceptible to coking and slowly cracked over time by a combination of air ingress and localised temperature excursions.

[thermal degradation, stress corrosion cracking, refining]

Lessons

Assuming that feedstock purchase decisions cannot be radically altered then some degree of fouling is inevitable.

6605 26 June 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 4TH QUARTER, 1994.
Location : El Palito, VENEZUELA

Injured : 0 **Dead :** 0

Abstract

Explosion on a catalytic cracker following the failure of a hydraulic supply to a control valve, regenerator/reactor equilibrium was lost and oil impregnated catalyst entered the regenerator.
[hydraulic failure, catalyst regenerator, cracking]

Lessons

[None Reported]

6600 23 June 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1994.
Location : Santiago De Cuba, CUBA

Injured : 0 **Dead :** 0

Abstract

Fire caused serious damage to refinery.
[fire - consequence, refining]

Lessons

[None Reported]

1093723 June 1994

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

Intermediate bulk containers (IBC), containing 36% hydrochloric acid, were being unloaded from a lorry, using a forklift truck.
The HCL was to be used for cleaning of cracked gas coolers. An IBC tipped sideways off the forklift truck and fell approximately 3 feet to the ground.
The top of the IBC fractured on hitting the ground, and the entire contents (1000 litres) spilled onto the ground. The acid was diluted with water then neutralised for disposal.
The IBC was fabricated from medium density polyethylene.
[unloading, material of construction failure]

Lessons

1. The IBC fell because the cotton spar of the supporting frame was missing, probably due to corrosion.
2. The IBC should have withstood a fall of 3 feet without rupture.
3. The IBC had exceeded its recommendations inspection periodicity. No inspection had been carried out at the recommended time or up to the time of the incident.
4. An inspection would have revealed the defective frame.

The following recommendations were stated:

1. Inspect all IBC's and frameworks for defects.
2. Visually inspect all IBC's and frames before commencing offloading from a lorry.
3. No defective equipment to be offloaded.
4. Have systems available to contain effluent spills that could contaminate works drains.
5. Ensure that only the correct type of IBC is used for a particular job.
6. Review forklift truck driver training and implement improvements if necessary.
7. Continue with investigations to establish why the IBC ruptured.

6597 21 June 1994

Source : WASTE ENVIRONMENT TODAY, 1994, 7, (7)., 18
Location : Bristol; Pennyslvania, USA

Injured : 39 **Dead :** 0

Abstract

Violent explosion in plant during mixing of trichlorosilane and styrene in a steel drum. There was a heatwave prevailing at the time which may have caused the unusual reaction during this normally routine mixing operation. The resultant fire took 5 hours to control. Incident led to the evacuation of 200 people in a half mile radius.
[runaway reaction, fire - consequence, weather effects]

Lessons

[None Reported]

6595 18 June 1994

Source : ICHEME
Location : , USA
Injured : 65 **Dead :** 0

Abstract

During unloading of trichlorosilane a pipe broke and aerial humidity ignited the material which reacts strongly with water. Led to the evacuation of thousands of people.
[unwanted chemical reaction]

Lessons

[None Reported]

6581 04 June 1994

Source : LLOYDS LIST, 1994, 6 JUN.; ICHEME
Location : Lavera, FRANCE

Injured : 5 **Dead :** 2

Abstract

A crude oil distillation unit at a refinery was shut down and undergoing major overhaul. The main fractionating tower and associated pipework had been flushed and emptied, steamed, water washed and isolated following normal procedures. Work permits had been issued to contractors permitting entry; cold work; and, subject to special permission, hot work. Before the incident, work had already been carried out in the tower and internal manways removed from the 48 trays in the tower.

On the morning of June 4, a contractor was granted permission to cut a coupon from a relief valve pipe on the lower end of the 50 inch tower overheads line. This line was open to the tower top and had open ends at the overhead/crude exchangers. A satisfactory gas test and a visual inspection was conducted through the relief valve stub. The difficulty of effectively draining the overheads 50 inch line was demonstrated when a sample of gas oil was later recovered from it some 20 meters or more distant from the tower. This gas oil was almost certainly distilled over during the steaming out stage. It is probable that a fire started inside the line at the point of hot work, as evidenced by the welder#s statement and confirmed by the melting of a synthetic textile sling in contact with the pipe. This melting was subsequently shown to require a temperature of about 300 degrees C. It would appear that the resultant smoke and hot vapours ascended the overhead line to the top of the tower. This upward flow was probably assisted by the aerodynamic effect of the 4.5 m/s wind around the 7.8 meter diameter tower, which induced a draft at the manway door. Once hot vapours started to rise up the line, a strong chimney effect resulted, rapidly carrying smoke and fumes to the top of the tower and out of manway. The scaffolder working in the tower dome detected the fumes and, fortunately, managed to escape. Smoke and fumes were then carried down the tower to lower manways by a down draft around the tower. It was this rapid penetration of smoke down the tower which most probably asphyxiated the two company personnel.

There were reports of pyrophoric fires within the top section of the tower during the incident. Scale believed to have been earlier taken from trays removed from the tower, indicated the presence of iron, sulfur and some combustible material. The elevated temperatures produced by the hot fumes from the overhead line would have dried out pyrophoric deposits in the upper section of the tower and caused them to ignite.

The actions to extinguish the fire were hindered by two factors.

1. The inability to get sufficient water to the top of the tower.
2. General lack of knowledge about the original fire in the overhead line; although the welder and the safety agent were both aware of this fire, they did not believe this to be relevant to the attack on the fire which they now perceived to be in the tower. Firewater was introduced into the manway by 10:15 hours, but this proved ineffective. The difficulty in raising hoses up a 70 meter tower in high winds complicated the fire attack and also resulted in injuries to personnel. Eventually it was decided to de-spade the top reflux line to introduce water; and this was successful, the smoke subsiding by 12:00 hours.

Immediate causes:

The method of isolation and hydrocarbon freeing of the tower and contiguous systems did not satisfactorily drain all liquid from the large 50 inch overhead line. Hot work on the overhead line most probably caused an internal fire, the line was free of gas but not hydrocarbon free.

The resultant hot combustion products entered the tower from the overhead line and were pulled down the tower and out of the lower manways by an aerodynamic effect produced by the wind.

These combustion products almost certainly promoted subsequent pyrophoric fires which may have been fuelled by carbonaceous deposits.

Personnel were working in the tower at the time when the fire broke out in the overhead line.

[fire - consequence, fatality, entry into confined space, hotwork, distillation, draining of line insufficient, isolation inadequate, management system inadequate, weather effects, asphyxiation, injury]

Lessons

Be aware of the risks posed by pyrophoric deposits in vessels which are shutdown and subject to entry - expect them on any unit containing H2S or high sulphur materials - and initiate a programme of nightly water flushing until vessels are free of pyrophoric material.

The term "gas free" does not simply mean "vapour free" testing and inspection of equipment must encompass checks for materials which could produce flammable/ toxic vapours on heating, or other hazards such as pyrophoric deposits or lack of oxygen.

Gas testers and those involved in the issue of permits must have sufficient technical background to understand the complexities of ensuring safe permit conditions, especially when entry and hot work is involved.

Sites must establish sufficient control systems to ensure that work being done does not hazard other adjacent personnel, it is particularly important to protect personnel in confined spaces.

Well trained rescue teams are needed to safely attempt rescues in situations such as encountered in this incident. Sites need to plan how best this can be achieved rapidly.

8313 June 1994

Source : ICHEME
Location : ,
Injured : 0 **Dead :** 0

Abstract

A fire and fatalities occurred at crude unit on a refinery. During major overhaul work, a fire developed in the main fractionating tower. It was found that there was inadequate isolation and hydrocarbon freeing of tower prior to hot work, and the approval to carry out work in tower was granted without knowledge of hot work to be performed. After investigation it was found that the hot work was authorised because the agent did not recognise the liquid in pipeline as gas oil, he was also unaware that absence of explosive atmosphere did not mean hydrocarbon free. In addition. Inadequate work planning, matching of experience with task, no knowledge of work being simultaneously carried out also contributed to this accident. Fatality.
[operator error, fire - consequence, testing inadequate, refining]

Lessons

1. Testing and inspection of equipment must encompass checks for materials which could produce flammable/toxic vapours upon heating, or other hazards such as pyrophoric deposits or lack of oxygen.
2. Gas testers and those involved in issuing permits must have sufficient technical background to understand the complexities of ensuring safe permit conditions, especially
when entry and hot work is involved.

6578 June 1994

Source : CHEMICAL ENGINEERING NEWS, 1994, 4 JUL.
Location : Kenvil; New Jersey, USA

Injured : 4 **Dead :** 0

Abstract

Explosion in plant when mixing nitrocellulose, acetone and other components.

Lessons

[None Reported]

6575 31 May 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1994.
Location : Kokkola, FINLAND

Injured : 1 **Dead :** 0

Abstract

Explosion in an organic intermediates plant. Substance involved 3,4 methylenedioxy-N-ethylaniline. Equipment, vacuum distillation column.

Lessons

[None Reported]

6570 27 May 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, JUL.
Location : , ADRIATIC SEA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. Explosion on a marine tanker at anchor after unloading monoethylene glycol on previous day. Vessel sank. [sinking]

Lessons

[None Reported]

6568 27 May 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1994.
Location : Ferndale; Washington, USA

Injured : 0 **Dead :** 0

Abstract

Fire occurred when a pump seal failed on a catalytic cracker and was rapidly extinguished. Crude unit also shut down.
[seal failure, fire - consequence, cracking]

Lessons

[None Reported]

6563 24 May 1994

Source : LLOYDS LIST, 1994, 9 JUN.
Location : Santiago De Cuba, CUBA

Injured : 0 **Dead :** 0

Abstract

Fire in gasoline section of refinery.
[fire - consequence, refining]

Lessons

[None Reported]

6558 19 May 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1994.
Location : Kaohsiung, TAIWAN

Injured : 0 **Dead :** 0

Abstract

Fire on a cracker in a furnace and was put out in 5 minutes. Caused thought to be due to cracked furnace tube. Substance involved naphtha.
[tube failure, fire - consequence, cracking]

Lessons

[None Reported]

6551 11 May 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1994.
Location : Tula; Hidalgo State, MEXICO

Injured : 10 **Dead :** 0

Abstract

Explosion and a fire at a refinery.
[fire - consequence, refining]

Lessons

[None Reported]

6542 09 May 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1994.
Location : Pascagoula; Mississippi, USA

Injured : 0 **Dead :** 0

Abstract

Fire in cracker at a refinery.
[fire - consequence, refining, cracking]

Lessons

[None Reported]

6528 01 May 1994

Source : LLOYDS LIST, 1994, 5 MAY.
Location : Cristobal, PANAMA

Injured : 0 **Dead :** 0

Abstract

During the unloading of fuel oil from a marine tanker a spill of 1400 barrels occurred due to a valve failure. A further 400 barrels were spilt when the flexible hose failed.
[hose failure]

Lessons

[None Reported]

1157901 May 1994

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

A leak of benzene occurred at a jetty after a ship had been loaded with the material. There were no injuries but in the course of the investigation traffic on a public road was halted for a period. The quantity lost was estimated at less than 10 gallons. Initial estimates based on instrument reconciliation however, put the leak at 20 tonnes. While investigating the suggested 20 tonne spillage, site personnel discovered some hydrocarbons on mudflats near the outfall to the river. These were subsequently found not to be associated with the benzene spill. A small pool of liquid under a flange on the benzene loading line was also discovered.
The leak was caused by pressurisation of the line. This was because a valve between the thermal relief valve and its discharge to the storage tank was closed. The calculated discrepancy was caused by an error in a level instrument on a tank that had not previously been used for benzene.
The hydrocarbon on the mud flats had accumulated over a long period. An expanding plug left in a drain after maintenance work had been preventing contaminated water from flowing to the correct route. As a result the material overflowed into the river directly.
The joint was re-made and pressure tested and the line returned to service.
The internal enquiry recommended:-
1. Improving procedures for returning relief valves and other safety devices to service after maintenance.
2. Reviewing the drainage systems in the jetty tank farm area to ensure proper hydrocarbon containment.
3. A review of procedures for contacting external parties in the event of an emergency.
[loading, overpressurisation, design or procedure error]

Lessons

1. Maintenance procedures for safety items were inadequate.
2. Drainage systems in a tank farm area should be reviewed.
3. Off-site emergency contact procedures should be reviewed.

8352 May 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Dock transfer line ruptures. During transfer of product at a product loading dock, a 16 inch crude oil line ruptured. There was damage to equipment, product loss, environmental damage, release to soil and water, cost of clean-up. Product expansion caused the pipeline to rupture. The basic cause was inadequate communications, including lack of written procedures. In addition the operator lacked facility knowledge.
[human causes]

Lessons

Well written procedures as well as knowledgeable operators are critical to safe conduct of any task.

8315 May 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Damage to vacuum tower trays at a refinery. This incident occurred when the vacuum tower experienced lower than acceptable levels when on recirculation, forcing recirculation to be stopped. Recirculation was again started but, when accumulator levels of light and heavy gas oils could not be sustained, the start-up efforts were aborted. It was found that there had been deviation from standard operating practice for normal start-up. Substantial amounts of water were present in the vacuum unit which were allowed to vaporise rapidly, creating enormous localised forces on the trays and beams. The cause of this incident was due to personnel rotation that left people assigned who were relatively inexperienced on crude/vacuum units and were unable to address the unusual situation. In addition operating procedures did not cover a scenario for starting up the vacuum tower from recirculation mode, without first having been completely shut down according to.

Losses, equipment damage and cost of repair $1.4 million (1994), production loss $5.3 million (1994).

[design or procedure error, damage to equipment, refining]

Lessons

Operating stages for start-up of vacuum distillation columns from cold or recirculation must follow strictly to agreed procedures, with great care taken to remove water from the system and to stay at all times within acceptable parameters of pressure and temperature.

8314 May 1994

Source : ICHEME
Location : ,
Injured : 0 **Dead :** 0

Abstract

A release of crude oil causes shutdown of a crude distillation unit at a refinery. Spill.
The incident occurred when a loss of lubricating oil pressure caused the turbine driven desalted crude oil pump to shut down. Pressure build up and unsuccessful attempts to start/re-start pumps led to mechanical equipment failure of the relief valve's bellows and failure of adjoining piping. It was found that carbon steel tubing, which transmits the lubricating oil system pressure failed. The cause was found t be lack of preventive maintenance and inspection schedules for tubing. In addition pump modifications conflicted with its design and the pump was not tested before being returned to service.
Losses: production loss $1.7 million (1994), local claims $10,000 (1994), equipment damage $160,000 (1994).
[process causes, design or precedure error, maintenance inadequate, refining, mechanical equipment failure, maintenance inadequate]

Lessons

Start-up and change-over switching arrangements for parallel pumps need to be routinely tested and available to operators. Modification to switching arrangements need to be agreed by all concerned and documented.

8344 May 1994

Source : ICHEME
Location : ,

Injured : 0 **Dead :** 0

Abstract

Total refinery power supply failure. All external electrical power supply was cut from the duplicate feeders to the refinery, resulting in an of all process units. It was found that there had been unauthorised switching of electric power. It is not clear why the unauthorised switching of electric power was allowed to take. Had there been adequate leadership/supervision, this event would not have occurred. An independent air supply would have enabled steam generation until emergency power was available.
[safety procedures inadequate, refining]

Lessons

Sites need to be aware that, even with two separate electrical feeders, power can still be lost from circumstances beyond their control.
Alternative instrument air supplies back up for essential users should be available.

6523 23 April 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1994.
Location : Corpus Christi; Texas, USA

Injured : 0 **Dead :** 0

Abstract

Fire at refinery damaged electrical cables and equipment. Hydrocracker plant shutdown for 3 weeks. Substance involved gas.
[fire - consequence, refining, cracking]

Lessons

[None Reported]

6517 20 April 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1994.
Location : Come By Chance, Newfoundland, CANADA

Injured : 0 **Dead :** 0

Abstract

Fire in a vacuum distillation column at refinery.
[refining, fire - consequence]

Lessons

[None Reported]

6515 19 April 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1994.
Location : Runcorn; Cheshire, UK

Injured : 1 **Dead :** 0

Abstract

Fire broke out in heating system of fluoro chemicals plant while it was shutdown.
[heating equipment, fire - consequence]

Lessons

[None Reported]

6502 11 April 1994

Source : LLOYDS LIST, 1994, 11 APR.
Location : Hidalago, MEXICO

Injured : 10 **Dead :** 0

Abstract

Explosion and fire at a refinery.
[refining, fire - consequence]

Lessons

[None Reported]

6503 11 April 1994

Source : LLOYDS LIST, 1994, 25 MAY.
Location : Sao Sebastiao, BRAZIL

Injured : 00 **Dead :** 0

Abstract

Spill of oil from marine tanker during unloading operations.

Lessons

[None Reported]

1155406 April 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A container was being loaded with shrink-wrapped pallet loads of bagged polyethylene product using a forklift truck. A proprietary mobile ramp was being used to allow access to the container, the platform of which is approximately 4ft above ground level. During the loading operation the ramp became detached from the container and resulted in the forklift truck and driver being placed in a hazardous position.
No injuries were sustained by the driver and damage to the fork-lift truck and ramp were minimal.
The cause of the accident was the failure to adhere to correct operating procedures for locating the ramp to the container.
[loading, operation inadequate, near miss]

Lessons

1. The secondary safety stop 'A' frame is to be bolted to the floor.
2. The loading ramp is to be fitted with a mechanical stop.
3. The security chains will be locked in position
4. Operating Instructions are to be revised.
5. All warehouse personnel to be given refresher training on container filling operation.
6. Housekeeping standards should be improved in the loading area.
7. Prior to further use of ramps inspections should be carried out to ensure the ramp is fit for purpose.
8. All 'near-misses' should be reported

8336 April 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A fire occurred on crude distillation unit at a refinery. During start-up of the crude distillation unit, a release of hydrocarbon vapour from the main fractionator column ignited. It was found that thermal stress had led to relaxation of flange bolts and a subsequent release of hydrocarbon. As changes during shutdown and start-up of the unit occurred, inspection and maintenance activities did not increase.

[maintenance inadequate, refining, gas / vapour release, fire - consequence]

Lessons

Operator routine walks through plants should include checking for flange leaks, especially during condition changes, and also during dramatic weather condition changes; e.g., heavy rain may provide thermal stress on hot flanges sufficient to cause relaxation.

6481 26 March 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, JUN.
Location : Chittagong, BANGLADESH

Injured : 0 **Dead :** 0

Abstract

A marine tanker loading high sulphur fuel oil drifted to middle of river after mooring buoy chains parted. Hose damaged but no spillage. Near miss.

Lessons

[None Reported]

1195623 March 1994

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

Drums containing CS2 (carbon disulphide) were being loaded onto a freight container by a forklift truck. When the driver removed the forks from the one pallet (holding four drums) he found a leak of CS2. It is thought that the trucks forks had pierced the bottom of a drum. To stop the leak, the driver placed the forks back into the hole and then moved the pallet to a nearby pool of water. When he removed the forks again the CS2 leaked an caught fire. The fire was controlled and extinguished.
[loading, fire - consequence, leak, human causes]

Lessons

[None Reported]

6458 08 March 1994

Source : BBC NEWS
Location : Essex, UK

Injured : 1 **Dead :** 0

Abstract

Fire in refinery.
[fire - consequence, refining]

Lessons

[None Reported]

8335 March 1994

Source : ICHEME
Location : ,
Injured : 4 **Dead :** 0

Abstract

Hydrofluoric acid exposures at a refinery. Upon breaking containment on a inch pipeline being replaced during turn-around, a small vapour cloud of isobutane and HF (hydrogen fluoride) (approximately one pound) was released, exposing four persons. It was found that the line was inadequately purged. The cause was inadequate procedures for ensuring that a line had been purged, and unclear instructions given to work team.
[operation inadequate, gas / vapour release, refining]

Lessons

A physical verification of purging must take place for all lines which are to undergo hot work.

6436 25 February 1994

Source : LLOYDS LIST, 1994, 26 FEB.
Location : Kawasaki; Tokyo, JAPAN

Injured : 0 **Dead :** 0

Abstract

Fire engulfed fluid catalytic cracker unit from leaking diesel fuel/ gasoline.
[fire - consequence, cracking]

Lessons

[None Reported]

8431 24 February 1994

Source : EUROPEAN CHEMICAL NEWS, 1995, 6, MAR, 12, MAR.
Location : Frankfurt, GERMANY

Injured : 2 **Dead :** 0

Abstract

Naphthol powder was being emptied from a metal container into a blender when the dust ignited. The stirrer was not working at the time. Electrostatic spark considered to be the ignition source.
[fire - consequence, dust explosion, charging reactor, naphthol]

Lessons

[None Reported]

6431 21 February 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 1ST QUARTER, 1994.
Location : El Secundo, USA

Injured : 0 **Dead :** 0

Abstract

Small hydrogen fire within refinery.
[fire - consequence, refining]

Lessons

[None Reported]

1091411 February 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A refinery experienced a major electrical power outage resulting in the shutdown of a substantial part of the refinery processing plant and the cooling water system. Although partial power was restored within 4 minutes, this was not quick enough to effect an immediate re-start of the shut down plants.
Costs incurred directly due to the power outage are estimated at $170,000, (1994) with additional costs and damages sustained on the FCCU indirectly related to the outage.
Due to extensive work over the last year and a half in the refinery around high voltage power lines (34.5 kV), opening and isolation of circuit breakers has been an almost daily occurrence.
Only two persons have been authorised to carry out the necessary electrical isolation. The isolation had become too routine, habit rather than procedure. On this occasion the isolating switch on the wrong circuit breaker was opened, resulting in loss of electrical power to major units.
[plant shutdown, electrical equipment failure, operation inadequate, refining, damage to equipment]

Lessons

The following recommendations were made:
1. Switching operations on high voltage circuits not to be done by a single person working alone.
2. Written procedures are required for such switching operations appropriate to the particular situation and circuit.
3. Communication between those making switching operations and control rooms is essential to verify the correctness of actions carried out.
4. Control room operators to be prepared to take the necessary corrective actions if power is inadvertently lost during switching operations.

8332 February 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Electrical power outage at a refinery. A major refinery power outage occurred, causing shutdown of the FCC (Fluid catalytic Cracker), Alky, and Coker units, and the once through cooling water system which supplies the surface condenser on the turbine. The operations supervisor opened isolating switch for the wrong 34.5 KV oil circuit breaker. The basic cause was a lack of written procedure for de-energising 34.5 KV loop. The procedure had become too routine and the incorrect switch was pulled out of habit rather than according to procedure. The procedure for using two people to re-energise the loop had been recently altered to allow one person to do this alone, due to manpower limitations.
Losses: estimated $142,000 (1994), $122,000 (1994) the result of 10 hours' lost throughput, and $20,000 (1994) for maintenance on the unit.
[cooling equipment, operator error, design or procedure error, plant shutdown, fluid cracker]

Lessons

1. A written procedure should be prepared and used for each 34.5 KV loop switching.
Line isolation should be done with two people, one to check the other.
2. Communication between control operator and the supervisor de-energising loop serves to verify the procedures as well as to keep the control operator advised as to what exactly is happening should something go wrong.

6391 24 January 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, APR.; LLOYDS LIST, 1994, 25 JAN.
Location : Noyelles-godault, FRANCE

Injured : 9 **Dead :** 0

Abstract

Explosion in refining tower of zinc refinery.

Lessons

[None Reported]

6376 09 January 1994

Source : LLOYDS LIST, 1994, 12 DEC.; HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, MAR.
Location : Suez, EGYPT

Injured : 0 **Dead :** 0

Abstract

Shore flexible hose coupling slipped and parted at berth during cargo unloading from marine tanker. Some vegetable oil was spilled into the water.

Lessons

[None Reported]

8358 January 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Isobutane release at a refinery. A vapour cloud of isobutane and water was released from an isobutane cooler (exchanger). The release was contained and the leak isolated. It was found that the water side of the exchanger froze, resulting in gasket failure between shell and channel cover.
Internal failure permitted isobutane to flow into the water side of the exchanger, this mixture of isobutane and water was released through the damaged gasket and from the steam vents which are part of the cooling water return system. The basic cause was a lack of a formal procedure for isolating and winterising the exchanger when it was not being used.
[weather effects, cooling equipment, spill, isolation inadequate, refining]

Lessons

Formal procedure for winterising this equipment should be established.

8397 1994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Hydrocracker heat exchanger failure at a refinery.

Two occurrences of tube failures in an exchanger in the reactor effluent circuit each resulted in the hydrocracker being shut down. There was damage to equipment, and product loss. It was found that erosion, corrosion stress was brought on by velocities in the reactor effluent exchangers which were in excess of the licensor's recommendations.

The inadequate identification of both the corrosion risk to reactor effluent circuit exchangers and the appropriate mitigation strategy caused this incident.

[reactors and reaction equipment, refining, cracking]

Lessons

Management of Change (MOC) techniques could have improved the timeliness of identifying both the corrosion risk to the reactor effluent circuit exchangers and the appropriate strategy to mitigate.

124131994

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 1

Abstract

An explosion occurred during loading operations. The incident occurred when two instrument technicians were filling the wet leg of a level transmitter with glycol. Near the completion of the job the glycol filling container exploded and struck one of the technicians. The technician died as a result of the injuries inflicted.

[permit to work system inadequate, fatality, loading]

Lessons

The report stated the following recommendations:

1. Work to be undertaken on live equipment to be covered by a valid permit-to-work and to be properly supervised. Isolation of process equipment and reopening upon completion of the job to preferably be carried out by process operators / supervisors.
2. For this kind of job, clear and unambiguous, written step-wise procedures are required. The steps to be followed to be elucidated by drawings showing the particular line-up with all instrument connections, process valves, vent valves, etc. These procedures have to be strictly adhered to by the technicians under all circumstances.
3. As the small non-return valve in a filling/flushing connector may fail an extra non-return valve at the filling pump is strongly recommended.

6351 24 December 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 1ST QUARTER, 1994.
Location : Pavlodar, RUSSIA

Injured : 0 **Dead :** 0

Abstract

Fire occurred within refinery due to a release of gasoline onto hot equipment.
[fire - consequence, refining]

Lessons

[None Reported]

6346 19 December 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, JAN.
Location : Hamburg, GERMANY

Injured : 0 **Dead :** 0

Abstract

Bow of marine tanker pushed from loading jetty during storm and 25 cm hose tore. 1000 litres of p-xylene spilled, part absorbed part went into harbour.

Lessons

[None Reported]

6348 19 December 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, MAR.; LLOYDS LIST, 1993, 31 DEC.

Location : Baton Rouge; Louisana, USA

Injured : 0 **Dead :** 0

Abstract

250000 lb chemical spill into river during unloading of perchloroethylene from barge to terminal.

Lessons

[None Reported]

6344 17 December 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, JAN.
Location : Quingdao, CHINA

Injured : 0 **Dead :** 3

Abstract

Explosion and fire on marine tanker during loading of crude oil at oil jetty. Vessel broke in two and sank. Fire burned for 12 hours. Fatality.
[fire - consequence, sinking]

Lessons

[None Reported]

6333 08 December 1993

Source : ICHEME
Location : , USA

Injured : 0 **Dead :** 0

Abstract

Fire in lowest section of packed distillation column when column was open for repair following scheduled inspection. Plasma arc cutting equipment was in use when spark ignited deposit within packing. Substance involved: adiponitrile. Fire lasted 4 hours and did $2 million (1993) damage.

Lessons

[None Reported]

6330 08 December 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 4TH QUARTER, 1993.
Location : Granger; Wyoming, USA

Injured : 5 **Dead :** 0

Abstract

Fire broke out at natural gas liquids (NGL) loading and storage terminal halting production at the 210 million scfd capacity gas plant.
[fire - consequence]

Lessons

[None Reported]

7517 December 1993

Source : LOSS PREVENTION BULLETIN, 122, 7-8.
Location : ,

Injured : 0 **Dead :** 0

Abstract

A fire occurred inside a large packed distillation column which was open for maintenance work. There were no personnel injuries but there was extensive damage to the column and its packing. The cost of repairs and the business interruption loss amounted to the equivalent of over £1 million (1993).
After investigation it was found that the column packing was of the structured type. It was fabricated from thin stainless steel sheets which were perforated and corrugated. They were assembled into packing elements in a way specific to the particular vendor. In common with packings of this type there was very restricted visibility into the packed bed, and no easy way of seeing down more that a few centimetres without dismantling the bed. The packing had appeared clean to those who viewed it before the accident.
The following recommendations were made:
1. Nuclear scan monitoring of packed columns to detect abnormalities.
2. Improved column cleaning procedures.
3. Proper consultation in planning work.
4. Training of personnel in the hazards associated with packings.
5. Closer supervision of major maintenance jobs.
6. Limiting hot work within process vessels.
7. Preferment of cold cutting techniques.
8. Proper selection of fire extinguishers.
9. Using a water hose reel at hot work sites.
10. Instruction on firefighting methods for tall columns in process areas.
[fire - consequence, hot work, damage to equipment]

Lessons

Although this accident provides many lessons, the three most important are as follows:
1. Management of change. When a maintenance shutdown plan is revised, take time to re-plan with proper consultation and approval, extend the management of change procedure to cover this.
2. Packed Vessels.
Treat all packed vessels as if they are contaminated; and avoid hot work within them.
3. Hot work precautions.
Contain sparks and debris, keep work area wet if possible, and have a water hose connected and at the ready.

6317 25 November 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, MAR.; LLOYDS LIST, 1994, 11 JAN.
Location : Pavlodar, KAZAKHSTAN

Injured : 0 **Dead :** 0

Abstract

A fire destroyed a refinery when a pipe ruptured in cold weather and released gasoline onto hot water equipment which then ignited.
[fire - consequence, refining]

Lessons

[None Reported]

8322 14 November 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Bitumen blower column overpressurised at a refinery. During start-up of the bitumen blowing unit, the bitumen blowing column was overpressured. Residue was blown from the top of the vessel and fell for a distance of about 150 metres. Water, that had entered the column undetected, vaporised to steam when it reached high temperature zone. Start-up procedures were slightly modified by individual experience of different shifts. Contributing was poor communications within the shift on at the time of the incident. The cause was due to start-up procedures being modified, albeit slightly; and no procedure existed for checking the guilty steam line.

[overpressurisation, refining, design or procedure error]

Lessons

Operating instructions must be carefully followed to ensure that water/light oils are not allowed to contact hot oils to avoid overpressurising equipment with possible rupture.

6277 31 October 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 4TH QUARTER, 1993.
Location : Convent; Louisiana, USA

Injured : 0 **Dead :** 0

Abstract

Fire caused shutdown of residue upgrade unit at refinery. Equipment involved: hydrocracker.
[fire - consequence, plant shutdown, refining, cracking]

Lessons

[None Reported]

6273 26 October 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, DEC.; LLOYDS LIST, 1993, 30 OCT.
Location : St Timothee; Quebec, CANADA

Injured : 3 **Dead :** 1

Abstract

An explosion occurred in a gunpowder drying shed.
[fatality, heating, black powder (gunpowder)]

Lessons

[None Reported]

6269 22 October 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, DEC.
Location : Buenos Aires, ARGENTINA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. A marine tanker barge sagged and cracked when loading, causing a spill of 90 tonnes of gas oil.

Lessons

[None Reported]

6267 21 October 1993

Source : OIL AND GAS JOURNAL, 1993, 15 NOV.; HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, FEB.; EXECUTIVE NEWS, 1993, 1 NOV.
Location : Nanjing, CHINA

Injured : 0 **Dead :** 2

Abstract

Workers neglected level alarms during mistaken filling of a 10000 cum (cubic metre) storage tank resulting in overfill with gasoline and spillage into an adjacent drain channel. Spillage ignited by tractor giving fireball. 100 tonnes of gasoline caught fire. Fire attended by 10 fire brigades and took 17 hours to extinguish. Fatality.
[overflow, fire - consequence, operator error, loading]

Lessons

[None Reported]

6260 13 October 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, DEC.
Location : Pulau Ayer Merbau, SINGAPORE

Injured : 0 **Dead :** 0

Abstract

Overfiring in furnace box during maintenance shutdown damaged 3 of 8 furnaces of naphtha cracker on petrochemical complex. Awaiting delivery of furnace tubes.
[cracking]

Lessons

[None Reported]

8323 13 October 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. An unloading incident from a marine tanker to a tank causing an overfill at a refinery.
While receiving an import of atmospheric residue, a gauge became stuck at an incorrect level, and the tank was overfilled. 100 kl of residue overflowed into a bunded area, of which 85 kl were recovered. Prior to the incident the tank had been surveyed and an error in its indicated dip identified. The incomplete installation of gauges in that dip tubes (stillwells) were not installed on the majority of the tanks at the time the gauges were installed. When the ship's discharge rate appeared to slow (the gauge had stuck), it was assumed by boardman that the ship was nearing the end of its discharge;
and he did not question the jetty operator. Also, boardman had no knowledge of the incorrect reading taken from the tank previously.
[overflow, refining, operation inadequate]

Lessons

Improved liaison between operators in monitoring transfers of hydrocarbons is required to avoid overfilling tanks.
Information on unreliability of instrumentation needs to be communicated between shifts.

6233 22 September 1993

Source : EUROPEAN CHEMICAL NEWS, 1993, 11 OCT.
Location : Mirande De Ebro; Castille, SPAIN

Injured : 1 **Dead :** 0

Abstract

An explosion of 5 tonnes of vinyl chloride monomer (VCM) ocurred at a polyvinyl chloride (PVC) plant, leaving one worker with minor injuries and disrupting production for about 1 month. The polymerisation reactor on one of the plant's two lines sped up, increasing the pressure inside and forcing vinyl chloride monomer out through a valve and into the air, when it exploded. Total capacity of 72000 tonnes per year not severely affected as plant not operating at full capacity.
[explosion, overpressurisation, reactors and reaction equipment, injury]

Lessons

[None Reported]

6228 19 September 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, NOV.
Location : Off Aliaga, TURKEY

Injured : 0 **Dead :** 2

Abstract

A marine tanker sank 700 m off port after loading 1000 tonnes of phosphotungstic acid. Alleged misloading and delay in taking ballast.
[sinking]

Lessons

[None Reported]

6227 17 September 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1993.
Location : Lysekil, SWEDEN

Injured : 0 **Dead :** 0

Abstract

Explosion and fire in desulphurisation unit at refinery.
[refining, separation equipment]

Lessons

[None Reported]

8343 September 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Reformer reactor flange fire at a refinery. During start-up of the reactor, after a small fire on the inlet flange, yet another fire broke out, this time on the bottom flange of the same reactor. It was found that the flange bolts were not secure. The basic cause was the absence of procedure for torque wrench tightening of bolts on reactor vertical flanges and inadequate inspection of flanges.
[fire - consequence, reactors and reaction equipment, refining, bolts incorrectly tightened, inspection inadequate]

Lessons

Flange bolt tightening techniques need to be correctly done, appropriate to the temperature range of the system from start-up to operating conditions.
Flange bolting can be loosened during heavy rainfall; e.g., flanges or fittings with the shanks of bolts exposed can be particularly vulnerable.

6193 18 August 1993

Source : EUROPEAN CHEMICAL NEWS, 1993, 4 OCT.; LLOYDS LIST, 1993, 20 AUG.; CHEMICAL ENGINEER, 1993, 16 SEP.
Location : Charleston; West Virginia, USA

Injured : 30 **Dead :** 1

Abstract

Explosion in reactor cooler in plant making insecticide and nearby chemicals were ignited. Cloud of irritant fumes. Fire-water runoff contaminated river. One victim inhaled hydrogen cyanide gas thought to have been produced when chlorine acetoaldoxime and hydrochloric acid came into contact. Debris from explosion slightly damaged storage tank containing methyl isocyanate. Fatality.
[heat exchanger, cooling, pollution, methyl isocyanate, acetoaldoxime]

Lessons

[None Reported]

1152804 August 1993

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

An uncovenanted trip of a boiler feedwater pump on a plant was followed by a delay in starting a standby (steam turbine driven) pump due to difficulties in clearing the pump's trips. This led to the tripping out of a furnace on low steam drum level, which in turn caused instability in the fuel gas system resulting in both boilers tripping out. Continuing difficulties with the feedwater pumps resulted in the loss of the remaining furnaces on low steam drum levels and to the progressive depressuring of the entire plant steam system. The consequent lack of steam led to a slow down in the propylene refrigeration compressor, and to flaring of the ethylene tower overheads, (due to lack of steam, some initial flaring was smoky, leading to complaints from the public). All the emergency shutdown systems operated correctly, and the plant was shut down in a safe manner.
Approximately 53 tonnes was flared, and 50 hours production was lost.
In an initial attempt to reinventory the ethylene tower, misunderstandings led to the depressurisation of the export line to below the minimum design temperature,(but the metallurgical limits of the pipework were not exceeded).
[ethylene, steam, cracking, pump, plant shutdown]

Lessons

[None Reported]

6177 04 August 1993

Source : LOSS PREVENTION BULLETIN, 115, 7-8.
Location : ,

Injured : 1 **Dead :** 0

Abstract

This incident occurred as an operator was setting up a rail tanker for unloading. The car was pressurised to about 20 psig (1.38 bar), an expected condition that results from the final leak test for the supplier. Following the standard company procedure for top unloading, the operator verified that the valve stem on the liquid line appeared to be in the closed position. The operator than cracked the cap of the liquid line while listening for any evidence of pressure. The operator heard no hissing, which indicated to him that there was no pressure in the line, and continued to turn the screw cap. As he reached the last turn the pressure blew off the cap and butyl acrylate discharged from the line, splashing him.
[spill, safety procedures inadequate]

Lessons

An investigation of the accident revealed that, the company procedure did not require the pressure on the car to be relieved through the vapour line before removing the liquid line cap, and that the valve did not have clear markings on to indicate whether or not it was closed, and the orientation and configuration of the valves were different on different rail cars This led to an inability of the operator to reliably confirm that the valve was closed.

8310 02 August 1993

Source : ICHEME
Location : ,
Injured : 0 **Dead :** 0

Abstract

A SCOT Unit at this refinery was scheduled for shut down on 3 August, to screen catalyst, as a high pressure drop across the reactor was limiting sulphur production. The shutdown procedure had been issued the week before, and it was re-issued again over the weekend in preparation for the shutdown. At 11.30 hours on 2 August, in preparation for the unit shutdown, and in order to stabilize the unit operation, the 16" start-up blower suction valve on the absorber overhead line, was cracked open. This move lowered the back pressure on the No. 2 Sulphur Train, allowing more process gas and air flow into the sulphur train. While the air to the train was being adjusted the heater outlet temperature dropped slightly. Fuel gas flow was increased to compensate for this temperature drop. Outside operators checked heater firing and reported the flames as slightly hazy. Additional fuel gas flow cleared this haze. Heater outlet temperature stabilized and unit operation looked okay. At about 15.30 hours the 16" blower suction valve on the absorber overhead line was opened further, and shortly afterwards, at about 16.00 hours, the SCOT heater inlet line was reported to be "cherry red". This line is insulated and has no temperature indication installed on it. Hydrogen to the SCOT unit was cut off immediately, the heater shutdown, and unit feed (Claus tail gas) diverted to the incinerator. Nitrogen flow was started through the heater via the blower suction line.
After the heater inlet line began to cool, additional nitrogen was added to the heater hydrogen supply line and later to the start-up blower discharge piping to aid in cooling. The 16" blower suction valve on the absorber overhead line was closed to prevent drawing heat back from the inlet line towards the incinerator. The heater outlet temperature dropped steadily and no further problems were noted.
An Incident Investigation Committee was set up and came to the following conclusions and recommendations.
1. The normal loop used for the blower operation was suspected to be plugged based on previous blower operation and the use of x-rays, it was recommended that the normal loop (Quench Tower Bypass) be insulated (this has been done).
2. The pressure drop across the SCOT reactor was too high for stable operation of the Sulphur Train; therefore develop shutdown guidelines based on plant performance, sulphur dioxide emissions versus allowable.
3. The lack of temperature indication on the inlet of the SCOT heater provided no early warning of an abnormal condition in the inlet line, so local skin couples should be installed on the line. Temperature sensitive paint will also be evaluated.
Other factors and recommendations arising from the incident:
1. There is a need for control room indication of the SCOT reactor pressure drop.
2. Operators responding to the incident should have worn self-contained breathing apparatus; this requirement will be incorporated into the Emergency Response Manual, other guidance.
3. A backflow prevention device on the blower is required and a request for a check valve should be submitted.
4. The ability to divert tail gas and the use of nitrogen purge could be hampered by the location of equipment; therefore, an engineering request will be submitted to specify the use of equipment needed for both the manual and automatic systems for nitrogen purge and for remote switches on the diverter valves.
[refining]

Lessons

Operators must frequently be reminded of the hazard presented by high concentration hydrogen sulphide found particularly in sulphur plant areas and the need to wear PPE when responding to emergencies or breaking equipment containment in any way
which can lead to escape of gas or sour liquids.
Overheating of lines due to uncontrolled combustion/sulphur pockets is not uncommon on such units, and operators must be aware of the rapid actions to take to prevent line or vessel rupture, as was done successfully in this incident.

6175 02 August 1993

Source : EUROPEAN CHEMICAL NEWS, 1993, 16 AUG.; CHEMICAL ENGINEERING, 1993, SEP.
Location : Dottikon, SWITZERLAND

Injured : 0 **Dead :** 2

Abstract

An explosion occurred when a methanol/toluene mixture was being routinely filtered using a pressure filter to make an undisclosed intermediate. Fatality. [separation equipment, filtration, methanol, fire - consequence]

Lessons

[None Reported]

6174 02 August 1993

Source : LLOYDS LIST, 1993, 4 AUG., & 27 SEP.; HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, SEP.; THE SUN BALTIMORE, 1993, 3 AUG.
Location : Baton Rouge; Louisiana, USA

Injured : 1 **Dead :** 3

Abstract

Explosion and fire in coker unit in refinery where heavy, tar-like oil is processed into gasoline. Cause found to be due to rogue valve, carbon steel instead of alloy, in the refinery. Fatality.
[incorrect equipment installed, refining]

Lessons

[None Reported]

8324 August 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Vacuum residue tank roof to shell seam failure at a refinery.
An atmospheric tank containing vacuum bottoms overpressured, releasing material into the immediate area and the community. There were no injuries. Previous damage to the tank roof went unfixed and was viewed as "normal" by operators.
Total dollar losses were in excess of $200,000 (1993).
The temperature of the product elevated due to pluggage of vacuum unit box cooler and the tank roof was damaged, possibly admitting higher oxygen content.
It was found that there was insufficient knowledge as to the safe operation of heavy oil tankage, and the tank used in a way other than that for which it was designed, it was used
beyond its design capabilities, and there was insufficient monitoring/observation of cooler while changes were being introduced.
[overpressurisation, refining, storage, damage to equipment, design inadequate, human causes]

Lessons

1. Rundown temperatures of residue to storage must not exceed safe levels.
2. Damaged tanks retained in service may exacerbate problems at a later date.
3. Temperature indications for storage tanks are usually poorly provided, giving operators limited reliable information. This needs to be considered when working close to safe temperature limits.

8353 August 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Coker unit fire at a refinery. During drum switch, a fitting in the feed circuit failed. Hot feed was released, which subsequently ignited. It was found that the fitting was fabricated from the wrong material and was unable to withstand operating conditions. The fitting was installed during construction and refinery was unaware of its presence.

[fire - consequence, material of construction failure, refining]

Lessons

A high degree of inspection testing is required to be confident that materials, as specified, are supplied and installed.

8334 August 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Crude distillation unit heater explosion in a refinery. During attempt to re-light crude furnace, following an emergency shut-down due to instrument air failure, an explosion occurred. Contributing to the incident was the urgency to re-light the furnace to prevent shutdown of the FCC (Fluid Catalytic Cracker) unit and related equipment. The cause was failure to follow safe-out and start-up procedures on the fired heater. There was damage to equipment and the total cost was estimated at $8 million (1993).
[instrumentation failure, human causes]

Lessons

Supervisors should increase the awareness of all personnel, particularly operators, to the potential for explosions during non-routine situations such as hot and cold heater light-offs. Personnel need to develop a healthy respect of situations and to proceed with caution. Done correctly, such operations pose minimal dangers. Done incorrectly, these operations can prove to be hazardous to personnel as well as destructive to equipment.

8333 August 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A platformer unit fire at a refinery. A fire occurred on a platformer reactor stack, and it burned for 5 hours. There was damage to equipment. It was found that a vertical section of feed inlet line to the No. 2 reactor failed. The failed section of line was noticeably out-of-round, which would have led to increased stresses. Costs estimated to be $1.5 million (1993) for maintenance/other and $6.2 million (1993) for production losses.
[fire - consequence, reactors and reaction equipment, refining]

Lessons

1. To prevent future failure of these and other high temperature piping systems, companies must be critical of fabrication qualification and selection.
2. On emergency response fire water delivery capabilities for elevations greater than 100 feet should be reviewed. Fire water systems are susceptible to host biological organisms which can plug or impede delivery equipment and tests should be made regularly, especially in warm climates.

8321 August 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Electrical fire occurred on a refinery. The motor control centre (MCC) faulted with resulting power outage and fire that affected an adjacent cable tray. The MCC was destroyed and cabling damaged. The exact cause is unknown due to the degree of damage. However, one suspected cause of the fault was flaking of the MCC power busbar silver plating. The initial fault persisted in the MCC due to a high fault operating trip setting on the upstream source/supply circuit breaker. The fault clearing time setting for the circuit breaker had been set at this level to prevent a fault on a motor circuit from tripping out the MCC, which would shut down more than the faulted equipment. Insufficient information available to determine basic cause. However, if flaking of the MCC power busbar silver plating was the immediate cause of the failure, then inadequate monitoring would be a root cause.
[control failure, damage to equipment, design or procedure error, fire - consequence,]

Lessons

A balance needs to be achieved between the level of protection provided to protect components of an electrical system and yet maintain continuity of the system as a whole, with as far as possible avoiding wider ranging power outages.
Motor Control Centres with silver plated bus bars should be routinely inspected to ensure there are no signs of excessive flaking from the bars.

6160 26 July 1993

Source : LLOYDS LIST, 1994, 21 FEB.
Location : Richmond; California, USA

Injured : 0 **Dead :** 0

Abstract

A rail tanker safety seal failed when unloading 45000 litres of oleum. White cloud formed. The highway and ship channel were closed and led to the evacuation of 2000 people.
[seal failure, sulphuric acid]

Lessons

[None Reported]

6154 16 July 1993

Source : LLOYDS LIST, 1993, 17 JUL.
Location : Henin-beaumont, FRANCE

Injured : 3 **Dead :** 9

Abstract

Cloud of zinc dust exploded in lead and zinc factory as workers were dealing with an abnormal pressure in one of the zinc refining towers. Fatality.
[dust explosion, incorrect pressure]

Lessons

[None Reported]

6152 16 July 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1993.
Location : Laporte; Texas, USA

Injured : 0 **Dead :** 0

Abstract

Lightning disabled refrigeration units. An attempted was made to transfer material but peroxide in containers decomposed and ignited.
[decomposition, fire - consequence, cooling]

Lessons

[None Reported]

6146 11 July 1993

Source : LLOYDS LIST, 1993, 6 AUG.
Location : Kaduna,

Injured : 0 **Dead :** 0

Abstract

Fire destroyed fluid catalytic cracking unit at a refinery. Substance involved gasoline.
[fluid cracker, catalytic cracker, fire - consequence, refining, cracking]

Lessons

[None Reported]

6132 24 June 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, AUG.
Location : Lazaro Cardenas, MEXICO

Injured : 0 **Dead :** 0

Abstract

Leakage of sulphuric acid in pump room on marine tanker during part unloading.
[spill]

Lessons

[None Reported]

6125 17 June 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1993.
Location : Carson; California, USA

Injured : 0 **Dead :** 0

Abstract

Fire in a hydrotreater.
[fire - consequence, refining]

Lessons

[None Reported]

6124 16 June 1993

Source : LLOYDS LIST, 1993, 18 JUN.
Location : Leghorn, ITALY

Injured : 0 **Dead :** 0

Abstract

Explosion and fire at a refinery.
[fire - consequence, refining]

Lessons

[None Reported]

6113 09 June 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1993.
Location : Bintulu, MALAYSIA

Injured : 0 **Dead :** 0

Abstract

Fire at a refinery.
[fire - consequence, refining]

Lessons

[None Reported]

6112 09 June 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, AUG.
Location : Buenos Aires, ARGENTINA

Injured : 2 **Dead :** 0

Abstract

Fire and explosion on marine tanker during loading of oil. Vessel sank.
[sinking]

Lessons

[None Reported]

8294 June 1993

Source : ICHEME
Location : ,
Injured : 0 **Dead :** 0

Abstract

Fire in out-of-service tank at a refinery. While maintenance crews were cutting a 6' by 9' access door into the tank with a torch, a fire broke out. The tank's primary seal was damaged as was the panel board of sludge processing unit which was located outside the tank, nearby. The immediate cause was failure to secure the job site for the tasks to be performed and failure in the implementation of the work permit system. Contributing to the incident was the separation of the primary and secondary seals from the tank wall, conditions were changed significantly enough to invite a fire. Subsequent inspection of the seal area between the primary and secondary seal revealed an accumulation of oily material.
The basic cause was inadequate planning, and a lack of adequate training and experience, the hazards involved with the tasks had not been recognized, and supervision and accountabilities for the job were not clearly defined.
[fire - consequence, damage to equipment, management system inadequate, refining]

Lessons

1. Cleanliness of equipment must be ascertained by both visual inspection and gas testing before issue of hot work permits.
2. Care must be taken to ensure that "trapped" pockets of oil, sludge, scale, which cannot be determined by gas testing alone, are not vaporized by hot work to give a flammable mixture with air leading to fires/explosions.
3. Strict observance of well established safe procedures (e.g., API 2015 "Safe Entry and Cleaning of Petroleum Storage Tanks") for cleaning equipment is essential, paying extra attention to recesses, the area behind linings, and other trapped areas.

6092 June 1993

Source : OIL AND GAS JOURNAL, 1994, 5 SEP.
Location : , VENEZUELA

Injured : 0 **Dead :** 0

Abstract

Accident in refinery caused by human error shut down catalytic cracker
[plant shutdown, operator error, cracking]

Lessons

[None Reported]

8363 June 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

High temperature corrosion in piping dead legs. After start-up of a crude distillation unit, smoke was seen coming from an uninsulated flange. It was found that a valve had failed due to internal corrosion. The basic cause was inadequate monitoring of dead legs, and the removal of unnecessary dead legs from service.

[valve failure, maintenance inadequate]

Lessons

The existence of process piping dead legs presents hazards which must be recognized and addressed.

6084 30 May 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JUL.
Location : Port Kelang, MALAYSIA

Injured : 0 **Dead :** 0

Abstract

Fire in pipe on marine tanker after unloading fuel oil.
[fire - consequence]

Lessons

[None Reported]

6082 27 May 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JUL.
Location : Flushing, NETHERLANDS

Injured : 0 **Dead :** 0

Abstract

A barge was in collision with a marine gas carrier loading butane at a refinery. Gas tanker holed aft. Loading completed without further incident. [marine transport]

Lessons

[None Reported]

6076 20 May 1993

Source : THE CHEMICAL ENGINEER, 1993, 16 SEP.; CHEMICAL HAZARDS IN INDUSTRY, 1994, APR.
Location : Institute; Charleston; West Virginia, USA

Injured : 17 **Dead :** 0

Abstract

Hose burst releasing 10 gallons chlorine at barge loading terminal.
[hose failure, gas / vapour release]

Lessons

[None Reported]

6075 19 May 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JUL.; OIL & GAS JOURNAL, 1993, 31 MAY.; LLOYDS LIST, 1993, 26 MAY.
Location : Jubail, SAUDI ARABIA

Injured : 0 **Dead :** 0

Abstract

Second fire in 3 months to hit refinery. Fire in butane stripping unit of hydrocracker.
[fire - consequence, refining, cracking]

Lessons

[None Reported]

6072 17 May 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JUL.; OIL AND GAS JOURNAL, 1993, 24 MAY.
Location : Catlettsburg; Kentucky, USA

Injured : 0 **Dead :** 1

Abstract

Failure of a heater in no 2 crude unit caused a flash explosion and release of heated oil. Fatality.
[heating]

Lessons

[None Reported]

6069 10 May 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1993.
Location : Pulau Merlimau, SINGAPORE

Injured : 0 **Dead :** 0

Abstract

Fire at a refinery.
[fire - consequence, refining]

Lessons

[None Reported]

6067 07 May 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JUL.
Location : Salvador, BRAZIL

Injured : 0 **Dead :** 0

Abstract

Wire rope on crane broke and 2 ISO tanks each containing 10 tonnes of triethyl aluminium fell to sea.
[unloading]

Lessons

[None Reported]

3252 01 May 1993

Source : LOSS PREVENTION BULLETIN, 116, 21.
Location : ,

Injured : 0 **Dead :** 0

Abstract

A magnetic drive pump used for mixing acid (70% nitric acid, 30% sulphuric acid) exploded. After a low level pump shut down, an operator went into the plant and started the off-line pump, which he did not see was blocked in. Upon returning to the control room, he observed the acid tank level to be still low. He called another operator in the plant to restart the acid pump. The second operator started the on line pump and did not notice that the off line pump was still running. There was an explosion in the off line pump.
[operator error]

Lessons

After investigation the following main causes were found:
1. The mixed acid pump was run against a dead head until it failed 11 minutes later.
2. Operator error.
3. Management of change procedure failure, a project to repair a flow switch to automatically stop the pump on 'no flow' had not been completed.
4. Maintenance pump running lights were not working.
5. Equipment identification, both pumps and start buttons were poorly identified.

6056 01 May 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JUL.
Location : Jacksonville; Florida, USA

Injured : 0 **Dead :** 0

Abstract

An overflow of a tank of fuel oil occurred during tanker unloading. Spill of 24000 litres.

Lessons

[None Reported]

6051 29 April 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1993.
Location : Abu Dhabi, UAE

Injured : 0 **Dead :** 0

Abstract

Mooring ropes and 2 floating hoses parted during heavy weather loading of a marine tanker. Minor spill of crude oil.
[weather effects]

Lessons

[None Reported]

6044 21 April 1993

Source : LLOYDS LIST, 1993, 23 APR.
Location : Rotterdam, NETHERLANDS

Injured : 0 **Dead :** 0

Abstract

Fire broke out in desulphurising installation at refinery. One feed pump became defective and oil leaked out and ignited.
[fire - consequence, pump failure, refining, separation]

Lessons

[None Reported]

6034 16 April 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JUN.
Location : Samsun, TURKEY

Injured : 0 **Dead :** 0

Abstract

Sudden wind during unloading of ammonia caused gas tanker to bend jetty loading arm.
[near miss, damage to equipment, weather effects]

Lessons

[None Reported]

6032 14 April 1993

Source : LLOYDS LIST, 1993, 23 APR.
Location : Ansan, SOUTH KOREA

Injured : 0 **Dead :** 0

Abstract

Accident at refinery during annual shut-down caused extended shutdown.
[refining]

Lessons

[None Reported]

6026 09 April 1993

Source : THE CHEMICAL ENGINEER, 1993, 29 APR.
Location : Te Rapa; Hamilton, NEW ZEALAND

Injured : 0 **Dead :** 0

Abstract

Pin-hole leak in spray nozzle within drier caused overheating at this wholemilk powder factory. Fire began on top floor.
[fire - consequence]

Lessons

[None Reported]

6024 08 April 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1993.
Location : Port Arthur; Texas, USA

Injured : 0 **Dead :** 0

Abstract

Tube ruptured in crude oil heater. Damage extremely severe and heater collapsed.
[fire - consequence, heating]

Lessons

[None Reported]

6015 05 April 1993

Source : LLOYDS LIST, 1993, 6 APR.; EUROPEAN CHEMICAL NEWS, 1993, 12 APR.
Location : Neratovice, CZECH

Injured : 12 **Dead :** 0

Abstract

Explosion and fire after maintenance work on vinyl chloride monomer polymerisation plant. Cause attributed to error by maintenance worker.
[fire - consequence, human causes]

Lessons

[None Reported]

6007 April 1993

Source : CHEMICAL HAZARDS IN INDUSTRY, 1993, AUG.
Location : , JAPAN

Injured : 0 **Dead :** 0

Abstract

Explosion in engine room of small marine tanker when loading naphtha.

Lessons

[None Reported]

8295 April 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A fire occurred during stress relieving at a refinery. During a heat treatment operation, to stress relieve new welds on the debutanizer column, a small fire, followed by a flash fire occurred in a bulk-head compartment. The immediate cause was poor combustion and inadequate purging. The basic cause was failure to recognise conditions

[maintenance inadequate, fire - consequence, refining]

Lessons

1. Gas burners connected into a refinery vessel require an equal degree of understanding and training to that which is imparted to operators for dealing with fired heaters.
2. Contractors left to their own devices, without a degree of supervision from the site,
3. Have a significant potential for harm. Experience shows that even well established
4. Contractors do not always have the expertise that they claim to have.

8309 April 1993

Source : ICHEME
Location : ,

Injured : 0 **Dead :** 0

Abstract

Lifting equipment failure at a refinery. A 5-tonne overhead hoist was being removed from the permanent lifting beam on the top deck of a tower structure. As the hoist was being rolled from its permanent support beam onto a lifting beam attached to a crane, it fell onto a pipe rack below. The immediate cause was the hoist removal failure. The basic cause was a lack of pre-planning, with appropriately qualified engineers.
Estimated at $1.6 million (1993), significant production loss, damage to pipe lane; undetermined impact on the TCC Unit.
[mechanical equipment failure, management system inadequate, damage to equipment, product loss, refining]

Lessons

Lifting operations within operating plant areas must be authorised through the appropriate level of management to ensure all the pre-planning, supervision, and safe-guards have been met.
Lifting above live processing plant/equipment must be carefully assessed, planned
and authorised, and where practicable, avoided or measures taken to limit possible consequences of a dropped load/overturned crane.

8296 April 1993

Source : ICHEME
Location : ,
Injured : 0 **Dead :** 0

Abstract

Boiler fan bearing failure at a refinery. Investigation of noisy forced draft fan resulted in monitoring and, thereafter, shutdown of boiler to examine the bearing housing. It was discovered that a considerable amount of sludge had built up in the bearing housing. The immediate cause was sludge forming mechanism that prevented adequate lubrication to the forced draft fan outboard bearing, causing the bearing to fail. Contributing to the incident was oil line to the oiler and other the other level indicator had been plugged with sludge and resulted in false oil level readings. The basic cause was that there was not an adequate means of checking the oil in the housing, therefore, the sludge build-up went undetected. The forced draft fan was a critical piece of equipment, and it was not possible to take it out of service to check the bearing housing without a shut-down.
Losses, unit throughput adjustments, $95,000 (1993), product adjustments, $56,000 (1993), maintenance, labour, and materials, $10,000 (1993), environmental violation.
[refining]

Lessons

1. When there is no redundancy (spare equipment) built into the process, it is essential that high integrity and well maintained lubricating systems are installed.
2. Quantities of lubricant used should be monitored to detect changes up or down, either of which can indicate potential problems.
3. Qualities of lubricants supplied should be
the subject of routine proof testing.

5997 24 March 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, MAY.
Location : Leverkusen, GERMANY

Injured : 0 **Dead :** 0

Abstract

Isophorodiamine entered water purification tanks after tank cleaning. Pollution alert issued.
[spill]

Lessons

[None Reported]

5991 19 March 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, MAY.
Location : Nikolovo, BULGARIA

Injured : 60 **Dead :** 5

Abstract

Massive chain reaction explosion from 2 unloading trucks next to warehouse with 60 tonnes of weapon fuse material. 2000 sq metre crater. Fatality. [explosive]

Lessons

[None Reported]

5981 10 March 1993

Source : TOXIC MATERIALS NEWS, 1993, 17 MAR.; HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JUN.
Location : New Albany; Indiana, USA

Injured : 0 **Dead :** 0

Abstract

A river transportation incident. Ruptured line on river tanker barge during unloading to factory caused 200 tonnes of toluene to spill to a river. City water intake upstream of berth.

Lessons

[None Reported]

5974 03 March 1993

Source : OIL AND GAS JOURNAL, 1993, 15 MAR.
Location : Big Spring; Texas, USA

Injured : 0 **Dead :** 0

Abstract

Fire at a refinery.
[fire - consequence, refining]

Lessons

[None Reported]

5970 March 1993

Source : LLOYDS LIST, 1993, 19 MAR.
Location : Horne; Quebec, CANADA

Injured : 0 **Dead :** 0

Abstract

Explosion in copper smelter.
[smelting furnace, heating]

Lessons

[None Reported]

8298 March 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Isocracker air cooler failure at a refinery. Shortly after discovering a minor tube leak in a tube of an air cooled heat exchanger bundle on the isocracker, the tube ruptured. The tube failed due to acid corrosion.
Due to the collapse of the trays in the Recycle Splitter 12 months previous, the bottoms temperature of the first-stage stripper was lowered by 15-25 degrees F (8-14 degrees C) from its normal operating temperature. This "subtle" change caused an increased water content in the stripper bottoms and, as a consequence, normally dry conditions in the second stage air cooler became wet and accelerated ammonium chloride corrosion.
Losses total of $1.6 million (1993), $1.1 million (1993) in lost opportunity and $0.5 million (1993) in maintenance and repairs.
[cooling equipment, tube failure, damage to equipment, cracking]

Lessons

Beware of small changes in operating conditions/modifications to plant, small changes in feedstock composition, etc. can produce accelerated corrosion conditions which may occur between inspection periods.
Regular removal of deposits from air cooled heat exchanger bundles/header boxes is recommended. Ensure any water flushing is done with chloride free water, and the bundle thoroughly air dried before return to service.

5969 28 February 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 1ST QUARTER, 1993.
Location : , SINGAPORE

Injured : 0 **Dead :** 0

Abstract

Small fire within a visbreaker caused 2 day disruption. Equipment involved: heat exchanger.
[fire - consequence, cracking equipment]

Lessons

[None Reported]

1087428 February 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

An explosion and fire occurred in the pipe alley of a Vacuum Distillation Unit. The incident was caused by the freeze-up and subsequent failure of a 2 inch carbon steel pipe which released a high pressure spray of light hydrotreated naphtha towards the vac furnace and transfer line, where it ignited.
There were no injuries, environmental impact was minimal. Total cost of the incident is estimated at $14 million - $10.5 million in production losses, the remainder in maintenance and associated costs.
Affected units were shutdown during the incident and recommissioned on the 24th March.
The failed line had been taken out of service approximately 20 years before, but had never been fully isolated or decommissioned. The piping acted as a large pocket or "dead leg," allowing water to accumulate. As the result of an extreme cold front on the 19th February, the trapped water froze, expanded, and cracked the pipe. During a subsequent warm up of the weather the next day, the ice plug melted, releasing hydrocarbon.
[fire - consequence, mechanical equipment failure, gas / vapour release, isolation inadequate, weather effects]

Lessons

1. Process piping deadlegs and lines in intermittent service should be identified and a program implemented to remove or safely manage them.
2. Fire proofing valves for certain services (e.g., fuel gas) will eliminate addition of fuel in fire situations.
3. Wherever possible, avoid flanges with "exposed bolts" which are subject to rapid failure under fire conditions.
4. Aluminium cladding on pipes/vessels, over insulation, gives only a very short time exposure under fire impingement.
5. Remote shutdown facilities for pumps on critical auto-start are required to allow over-ride in fire situations, to avoid adding fuel to fires.

5964 24 February 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, APR.

Location : Off Fiumicino, ITALY

Injured : 0 **Dead :** 0

Abstract

Faulty hose at offshore terminal during unloading from marine tanker caused limited spill of crude oil to sea.

Lessons

[None Reported]

5957 20 February 1993

Source : LLOYDS LIST, 1993, 22 FEB, 29 MAR.
Location : Toledo; Ohio, USA

Injured : 0 **Dead :** 0

Abstract

At about 08.58 hrs on the 20th February, 1993, an explosion and fire occurred in the pipe alley west of this vacuum distillation unit due to a failed line.
There were no injuries, environmental impact was minimal.
Total cost of the incident is estimated at $14 million - $10.5 million(1993) in production losses, the remainder in maintenance and associated costs.
After interviews with the operators and inspection of the pipe alley following the fire and explosion, it was determined that a stream of vapour and liquid naphtha released from the fractured 2 inch line was ignited by either the vac furnace or the hot transfer line. This produced a brilliant flash-back towards the source of the leak and a moderate intensity explosion. Immediately subsequent to this, a much larger explosion and fire erupted in the area of the vac furnace and transfer line.
The fire was caused by a freeze-up failure of a 2 inch carbon steel pipe which released a spray of light hydrotreated naphtha (LHN) under 95 psig pressure towards the vac furnace and transfer line where it ignited. Based on eye witness accounts of the initial flash location and an assessed autoignition temperature for LHN as under 550 degrees F, it is most likely that one of the uninsulated flange joints on the vac transfer line from the heater to tower was the source of ignition (metal temperature of exposed flanges would have exceeded 700 degrees F).
During the morning of the 19th February, 1993, the local area had experienced an extreme cold front, with temperatures falling below 10 degrees F. The trapped water in the line froze, expanded, and cracked the pipe just under the orifice flange. The spray release occurred when the ice plug in the line started to melt on the following morning. At the time of the failure the ambient temperature was 25 degrees F, but the temperature in the immediate area of the release was probably higher because of adjacent heat exchangers. Alternatively cascading water from a broken 3/4 inch bleed valve on the tower may have melted the ice plug. Once a path for any leakage had been established, naphtha at 80 degrees F and 95 psig would quickly melt and dislodge the ice plug. The 5 inch x 3/8 inch vertical crack just beneath the orifice flange had the classical brittle appearance of a freeze-up failure with virtually no wall thickness reduction and little change in pipe diameter. The failed 2 inch line was taken out of service about 20 years ago when the refinery stopped making a paarticular fuel. The line was never fully isolated or decommissioned, leaving the section under pressure with no flow. This allowed water to accumulate in the "dead leg." The most likely source of water was from the steam purging during the October, 1992, turnaround. Although there are drain valves located at the bottom of the dead leg, these were never drained. Other, but less likely, sources of water are from process stream malfunctions or in feed streams from tankage. The dead leg piping could have been removed, or if desired to retain, modified and periodically drained.
[refining, cold weather, fire - consequence]

Lessons

1. Process piping deadlegs and lines in intermittent service should be identified and a program implemented to remove or safely manage them.
2. Process hazard analysis should include reviews of isometric drawings and a physical survey of piping in the units.
3. Management of Change procedures are required to enhance safe management of lines which are decommissioned.
4. Fire proofing valves for certain services (e.g., fuel gas) will eliminate addition of fuel in fire situations.
5. Wherever possible, avoid flanges with "exposed bolts" which are subject to rapid failure under fire conditions.
6. Aluminium cladding on pipes/vessels, over insulation, gives only a very short time exposure under fire impingement.
7. A callout system which uses a multiple coded bleeper arrangement can reduce the response time for emergency teams and management.
8. Winterization programs at refineries are essential to protect equipment from freezing and rupturing.

1114013 February 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Approximately 12 tonnes (14,500 l) of white oil escaped into the bunded/diked area of a tank farm from an open drain valve during the filling of rail cars with white oil. The site's vacuum truck was used to recover the majority of the spillage, but some of the contaminated earth in the tank farm area had to be excavated and removed off site as special waste. The total loss was estimated at $32,000 (£19,200) (1993).

Product from storage tanks is transferred by means of screw pumps to a hose station/manifold. From the hose station/manifold, cross connections can be made from various storage tanks to a considerable number of filling lines, by means of flexible hoses. The filling lines are either dedicated to specific products or product groups. There are no dedicated lines available, however, for different grades of white oil to be loaded. In order to avoid contamination between grades, each filling line is cleared of the previous grade by means of a pipeline pig. At the end of the pigging operation the pig rests in the pig launcher/receiver at the hose station/manifold. The launching/receiving chamber has a mechanical device fitted for determining whether the pipeline pig is actually in the chamber. The chamber is simply a 4 inch "T"-piece, installed vertically and with a side entry for the product. The lower end of the T-piece is closed with a bolted blank cover and houses the pipeline pig, whereas the upper end is connected to the filling line. The end cover below the pig carries a three quarter inch nozzle, to which another T-piece is connected with ball valves at either end, one for depressurizing/draining the system and the other for supplying pigging air. The drain line terminates in a 2 inch header, which collects rain water from dripping pans and is connected up to a sewer box. The sewer box has a level-controlled (start/stop) pump fitted, which transfers any drain water to one of the oil interceptor pits upstream of the effluent treatment plant. The pigging air valve is only opened when the pigging operation is going on. However, the drain valve is kept open during filling. This means that the pipeline pig must have a tight fit in the launcher/receiver, as it is the only means of isolation between the product transfer at approximately 6 barg and the draining system. The operation was not designed this way. The system was installed some 15 years previous, and there had been difficulties during the transfers with the drain valve closed. This resulted in the pipeline pig rising in the piping, restricting flow. Someone then had the clever idea to leave the drain valve open. This mode of operation, however, introduced the potential risk of product entering the drains in quantities in excess of the capacity of the system, should the pig fail to isolate the drain. In such a case the drain line would be back pressured and product would be driven back into the dripping pans and escape into the bunded/diked area.

To avoid a repatition of this incident a full bore ball valve will be installed between the pig launching/receiving chamber and the product entry in order to keep the pipeline pig in its housing during product transfers and to obtain positive isolation between the filling line and the draining system.

[loading, contamination, product loss, management system inadequate, operator error]

Lessons

The following recommendations were made:

Operators must be made aware that any departure from normal operating practices require scrutiny through the Management of Change procedure.

All transfer operations should be subjected to periodic hazard analysis with appropriate employee participation.

1086908 February 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A refinery suffered a serious near miss incident when with-drawing a corrosion probe from a 14 inch live piping system on a Crude Distillation Unit. Unknown to the inspection engineers, the outer probe holder had suffered stress corrosion in service and had broken completely about 14 inch from the tip during the withdrawal operation.

There was a significant release of light hydrocarbon gases through the annular space between the probe holder and the probe when the broken part of the holder passed the retaining gland.

It proved impossible to close the valve on the tapping into the process line as the piece of the probe holder that had broken away was still lying in the valve body. The piping and associated heat exchanger had to be isolated to stop the release. Fortunately, no ignition occurred, and there were no injuries.

[gas / vapour release]

Lessons

The report stated the following recommendations:

1. When working on pressure circuits on-stream, thought must be given to the possibilities of accidentally breaking containment, e.g. changing corrosion probes, inadvertent removal of thermowells etc,
2. Materials for all components in a system subject to corrosion must be such that sudden failure will not occur leading to release of hazardous materials.

3578 February 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Near miss on extraction unit at a refinery.
While operators were in the process of isolating burners, an explosion occurred in the heater box. The cause was improper adjustment of equipment while it was being operated, and insufficient operator training (insufficient knowledge).
[operator error, refining, heating equipment]

Lessons

1. Operator training to include study of precautions needed in taking instrument control loops onto manual, in respect of effects this may produce on process.
2. Fired heater safe operation practices retraining required, e.g., use of remote "heat off" facilities, judicious operation of flue gas dampers, limitations on rate of change in firing, etc.

6841 February 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Corrosion probe stress. Significant release of hydrocarbon gases when withdrawing a corrosion probe from a live piping system on the crude distillation unit. The outer probe holder had suffered stress corrosion in service, and a piece of the probe holder broken away when it was being withdrawn (defective equipment). The basic cause was that the probe holder material could not resist corrosion cracking, it was improperly selected.
[material of construction failure, incorrect material of construction]

Lessons

Materials for all components in a system subject to corrosion must be such that sudden failure will not occur leading to release of hazardous materials.

5939 29 January 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, MAY.

Location : Salt Lake City; Utah, USA

Injured : 9 **Dead :** 0

Abstract

Gas cloud filled plant when 11 litres of hydrochloric acid was mixed with 8 litres of hydrogen peroxide.
[mixing, gas / vapour release]

Lessons

[None Reported]

5938 23 January 1993

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

An LPG gas carrier broke loose from moorings at a jetty during an unusually severe squal while loading butane. No injuries or damage were sustained but a full investigation was carried out due to the potential of the incident. The loading arms reached the limit of their envelope and disconnected without loss of material. The vessel was brought to anchor after just missing another vessel.
[weather effects, marine transport, inadequate mooring, near miss]

Lessons

[None Reported]

5934 20 January 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, MAR.
Location : Caleta Olivai, ARGENTINA

Injured : 0 **Dead :** 0

Abstract

Second spill in 6 days at refinery when 22 700 litres of crude oil spilt from marine tanker during loading.

Lessons

[None Reported]

5925 16 January 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, MAR.
Location : Caleta Olivares, ARGENTINA

Injured : 0 **Dead :** 0

Abstract

20 inch underwater hose leaked during loading of oil tanker at refinery. A spill of 38 000 litres of crude oil occurred. Pollution covered harbour and 7 km of beaches

Lessons

[None Reported]

5921 14 January 1993

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 1ST QUARTER, 1993.
Location : Hokkaido, JAPAN

Injured : 4 **Dead :** 2

Abstract

Explosion on ship as it was during loading with naphtha. Boiler was being examined when explosion occurred. Fatality.
[inspection]

Lessons

[None Reported]

5916 13 January 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, MAR.
Location : Muroran, JAPAN

Injured : 3 **Dead :** 6

Abstract

A marine transportation incident. Explosion and fire in engine room of a marine tanker during unloading of naphtha. Fatality.

Lessons

[None Reported]

1088602 January 1993

Source : ICHEME
Location : Florida, USA

Injured : 0 **Dead :** 1

Abstract

An explosion and fire occurred on a tank, 100 feet in diameter, with a covered floating roof (steel pan).
The tank's content was unleaded gasoline with added butane to increase RVP. Exact composition of fuel not known.
A tanker was unloading gasoline to the tank when, during the night of 2 January, 1993, an overflow occurred. The overflow from the tank was estimated to be about 50,000 gallons in size. Intended transfers to another tank had not occurred. At about 03.15 hours there was a tremendous explosion which rocked the area, with a fireball sent hundreds of feet into the air.
Only one operator was on duty and had, at some time, driven his vehicle (gasoline engine) into the bunded area presumably to monitor tank filling.
It was subsequently established that the incoming fuel flow was such that fuel was ejected through the top roof vent so that thousands of gallons of fuel covered the area both inside and outside the bund. Potential ignition sources included the operator's company vehicle (his body was found about 10 feet from the vehicle), overhead power lines, or other sources outside the bunded area.
[fire - consequence, floating roof tank, static, road transport, fatality]

Lessons

[None Reported]

1827 January 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Failure of belt press at a refinery.
Roller on belt press at waste water treatment unit broke, causing further damage to equipment. Failure of a weld on the stub shaft was the immediate cause and the basic cause was inadequate inspection of rollers when they were installed The reconditioned replacement rollers were not "as good as new".
Losses: equipment replacement, repair, cost of maintenance, including expense of rental unit $80,000 (1993).
[weld failure, installation inadequate, refining]

Lessons

If reconditioned rollers are purchased, proper inspection must be performed before installation.

8300 January 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Fire at waste gas incinerator. A small fire developed on the waste gas incinerator of a Fluid Catalytic Cracker Unit (FCCU) complex. Shortly thereafter, a gas cloud escaped through the incinerator's explosion doors. The immediate cause was product carry-over that created a fire hazard, the basic cause was instrument alarm failure and suction filters of slop oil pump were blocked. Contributing was the incorrect execution of VDU start-up. Damage repairs: $137,000 (1993) (U.S.).

[fire - consequence, instrumentation failure, operator error, gas / vapour release, heating]

Lessons

Operational start-up procedures for units should consider possibilities of overloading/ carryover of hydrocarbons in effluent disposal streams to incinerators. Address how to avoid and what remedial actions are needed.

Slops disposal pump filters need regular attention and should be checked for cleanliness before unit startups.

8297 January 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Cracking unit kiln temperature excursion at a refinery. Temperature excursion encountered during start-up of a catalytic cracking unit.
The investigation team concluded that there were, actually, three separate incidents being realised at the time of the temperature excursion. An immediate and basic cause is provided for each of the three incidents.
Immediate cause
1. Deviation from normal operating procedures during start-up (Operating (equipment) without authority).
2. Leaving plate (blind) in the kiln outlet hopper after maintenance (Failure to secure).
3. Faulty board level instrumentation (Warning system).
Losses: catalyst damage, loss on margins, maintenance, environmental fines, for a total of $3.25 million (1993).
[damage to equipment, refining, human causes, catalytic cracker]

Lessons

1. Clear, written instructions covering all operating phases, operating limits, safety systems and their functions.
2. Safe work practices and mechanical integrity program to assure the integrity of plant and instrumentation prior to start-up.
3. Thorough training of operators.

8046 January 1993

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Fire on vacuum distillation unit at a refinery. A release of a high pressure spray of light hydrotreated naphtha towards vacuum furnace and transfer ignited, resulting in explosion and fire. The spray came from "dead leg" line taken out of service 20 years previous. Extremely cold weather allowed trapped water to freeze, cracking the pipe, warm temperatures the following day caused ice plug to melt, releasing hydrocarbon. Failed line had never been fully isolated or decommissioned.

Losses; total $14 million (1993), including $10.5 million (1993) in production losses.

[weather effects, refining, fire - consequence, maintenance inadequate]

Lessons

1. Process piping dead legs and lines in intermittent service should be identified and a programme implemented to remove or safely manage them.
2. Process hazard analysis should include reviews of isometric drawings and a physical survey of piping in the units.

5902 1993

Source : CHEMICAL HAZARDS IN INDUSTRY, 1993, DEC.
Location : , GERMANY

Injured : 0 **Dead :** 1

Abstract

An aqueous dispersion was kept under nitrogen. A loading error required the tank to be emptied, cleaned and refilled. The operator went away to check the water supply, the driver opened the manway lid to check that the tanker was empty. He was found dead inside the tanker having lost consciousness and fallen in. Fatality.
[asphyxiation]

Lessons

[None Reported]

109101993

Source : ICHEME

Location : ,

Injured : 2 **Dead :** 1

Abstract

The following tragic incident is short on detail, however, it provides yet another warning of the hazards of hydrogen sulphide to be found in some crude oils in higher than normal concentrations.

The incident took place sometime in early part of 1993 by exposure to a very high hydrogen sulphide content during the unloading of crude oil. The operation was under the control of specialist cargo inspectors. Two inspectors and one crew member were gassed during sampling/measuring of the ship's tanks.

All three victims were transported immediately to hospital A crew member, unfortunately, did not survive.

[inspection, asphyxiation, leak, fatality]

Lessons

The following recommendations were made:

If sour crude or other oils are discharged into shore tanks these will probably remain sour in their vapour space for some considerable time, despite subsequent sweet imports. Care is, therefore, needed with operations involving such tanks.

5894 1993

Source : CHEMICAL HAZARDS IN INDUSTRY, 1994, APR.

Location : ,

Injured : 0 **Dead :** 0

Abstract

Discharge of detergent from loading bay to river caused fish kill. Analysis of the discharge showed hundreds of milligrams per litre of anionic and non-ionic surfactants and phenols. Pollution.

Lessons

[None Reported]

8327 1993

Source : ICHEME

Location : ,

Injured : 2 **Dead :** 1

Abstract

A marine transportation incident. Gassing incident during unloading of sour crude oil from a marine tanker. Two inspectors and one crew member were gassed during sampling/measuring of the ship's tanks. Protective equipment was not used in this hazardous atmosphere, and workers were not aware of the potential hazards of H2S, hydrogen sulphide. Fatality.
[asphyxiation, safety procedures inadequate]

Lessons

With the introduction of inert gas blanketed cargo tanks, the latter no longer "breathe" on voyage; and, therefore, even small concentrations in the liquid space build up to high values in the vapour space. Exposure of personnel to this inert gas/H 2 S mixture will produce rapid loss of consciousness leading to death. Rescue attempts should only be made when wearing the appropriate respiratory protection.

3217 25 December 1992

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A fire was detected by a refinery off-site operator, at roof level of a 19.5 metre high external floating roof crude storage tank.
Losses were of $165,000+ (1992), and half of the primary and secondary seals of the tank were damaged there was also shell deformation in the upper structure.
Environmental damage. At the time of the accident weather conditions were poor and there was a great quantity of lightning. High intensity lightning would produce a spark even if the tank is equipped with safety preventative equipment and the seal in
good condition, as was the case in this incident.
[floating roof tank, refining, fire - consequence, damage to equipment]

Lessons

Once lightning protections are installed and seals and roofs are properly maintained, the emphasis has to be put on having adequate fire-fighting capabilities, and properly training refinery personnel.

5884 24 December 1992

Source : ICHEME
Location : , UK
Injured : 0 **Dead :** 0

Abstract

A spill of 9.5 cum (cubic metres) cumene occurred into a dock when loading ethanol. The cumene came out when the ballast water was pumped out. This incident was attributed to structural failure on the bulkhead between the cargo tank and the segregated ballast tank.
[material of construction failure]

Lessons

[None Reported]

5883 24 December 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, FEB.

Location : Mount Airy; North Carolina, USA

Injured : 15 **Dead :** 0

Abstract

A road transportation incident. A road tanker unloading propane to a storage tank moved off causing leak and 3 explosions. Led to the evacuation of 200.

Lessons

[None Reported]

5879 21 December 1992

Source : OIL AND GAS JOURNAL, 1993, 4 JAN.

Location : Norman Wells Refinery; Northwest Terrorities, CANADA

Injured : 0 **Dead :** 0

Abstract

Fire shut down refinery.
[fire - consequence, plant shutdown, refining]

Lessons

[None Reported]

5878 19 December 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, FEB.
Location : Savona, ITALY

Injured : 0 **Dead :** 0

Abstract

Crane cable broke when loading gas tanker cargo tank weighing 350 tonnes.

Lessons

[None Reported]

7629 15 December 1992

Source : LOSS PREVENTION BULLETIN, 131,13-14.

Location : ,

Injured : 0 **Dead :** 0

Abstract

Workers at a petrochemical facility were carrying out preparatory work for a decoking operation at one of the ethylene cracking furnaces. Decoking is a routine operation to remove the coked layer formed inside reaction tubes under normal operation by burning with high temperature air-steam mixtures. During this operation naphtha leaked from a 3/4 inch (1.9 cm) drain valve installed on a feed line and ignited, causing a fire. The supply of the feed fluid and fuels to the furnace and one of the adjacent furnaces was cut off immediately. The valves located upstream of the feed lines were closed also. It took approximately an hour for fire-fighters to contain the fire. With exception of these two furnaces, operation of other three furnaces in the unit was continued. [fire - consequence, maintenance]

Lessons

The following recommendations were made:

1. Relocation of control valve, removal of drain valve and installation of a new vent valve.
2. Review and modification of the existing operation manuals and check-list.
3. Thorough training of operators.

5874 14 December 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, FEB.
Location : San Lorenzo, ARGENTINA

Injured : 0 **Dead :** 0

Abstract

Hose broke on marine tanker during loading at refinery. A spill of 22 700 litres of fuel oil occurred.
[hose failure]

Lessons

[None Reported]

5870 03 December 1992

Source : FIRE PREVENTION, 1993, JUL/AUG.
Location : Porvoo; Skoldvik, FINLAND

Injured : 0 **Dead :** 0

Abstract

Fire in oil refinery.
[fire - consequence, refining]

Lessons

[None Reported]

8301 December 1992

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

High pressure drop isocracker reactor. Periodic pressure measurements on the first bed of the second stage reactor revealed pressure drops greater than the maximum allowable. The unit was shutdown ahead of schedule to change the catalyst. A blockage caused by a 4-inch layer of soft crust material, forming a brick-and-mortar pattern between catalyst particles, developed in the reactor causing the high pressure drop. The primary basic cause was corrosion of upstream low-chrome steel plant that had deposited fine iron sulphide particles on the top bed. The secondary cause was that a coarser filter element had recently replaced a fine element on feed stream, allowing more particles to filter through.

Actual Losses Production losses, $926,000 (1992), labour, $70,000 (1992), materials, $414,000 (1992).

[product loss, low pressure, reactors and reaction equipment, cracking]

Lessons

Monitoring of systems should detect changes in corrosion rates to allow preventative actions to be taken.

Changing filter element mesh sizes should be subject to technical considerations and approval. Apart from operational problems, different filter mesh sizes may not be adequate.

If too coarse, may produce excessive static electric charge; if too fine, etc.

5860 25 November 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JAN.
Location : Port Harcourt, NIGERIA

Injured : 0 **Dead :** 0

Abstract

Pressure spray at manifold, when the loading of gasoline was started in error, ignited and damaged marine tanker and tug.
[fire - consequence]

Lessons

[None Reported]

7602 09 November 1992

Source : LOSS PREVENTION BULLETIN, 129, 6.

Location : ,

Injured : 0 **Dead :** 0

Abstract

Operations were normal at this 136,000 barrels-per-day refinery when a vapour cloud explosion occurred in the 29,700 barrels-per-day fluid catalytic cracking (FCC) unit. The initial vapour cloud explosion and several subsequent lesser explosions could be heard approximately 18 miles from the refinery. An estimated 5000 kg pounds of light hydrocarbons were involved in the initial explosion.

A gas detection system in the FCC unit sounded an alarm, indicating a major gas leak in this unit. While the unit operator was contacting the security service to warn of this situation, the initial explosion occurred. The initial gas released is believed to have resulted from a pipe rupture in the gas plant, which is used to recover butane and propane produced in the FCC unit.

The explosions and subsequent fires devastated about two hectares of this refinery, which covers a total area of about 250 hectares. The FCC unit and associated control building were destroyed by this incident. Two new process units under construction, which were scheduled to come into operation in 1993, were seriously damaged. Outside the refinery, roofs were damaged in a nearby town, and windows were broken within a radius of 900 m, with some windows broken up to six miles away.

The refinery fire brigade and over 250 firefighters from three neighbouring industrial sites and four nearby towns were used for more than six hours to bring this incident under control. Approximately 140,000 litres of foam concentrate were used during the fire fighting effort. Some fires were intentionally left burning for a few hours after the incident was under control to allow safe depressurising of the process units since the flare system was particularly damaged by the explosions.

[catalytic cracker, refining, fire - consequence, fluid cracker]

Lessons

[None Reported]

5847 09 November 1992

Source : OIL AND GAS JOURNAL, 1993, 8 MAR.; HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JAN.; LLOYDS LIST, 1992, 10 &16 NOV.; THE INDEPENDENT, 1992, 10 NOV.

Location : Marseilles, FRANCE

Injured : 12 **Dead :** 6

Abstract

Explosion in catalytic cracker in refinery. There was a subsequent fire in a gasoline tank and cryogenic unit involving propane and butane. Cause believed to be due to the rupture of a pipe carrying LPG to a low pressure gas scrubber. The inquiry concluded that 10 tonnes escaped and exploded after leak from pipework in one of the gas plant towers recovering liquified gas produced by the upstream catalytic cracker. The leak was probably caused by corrosion. Fatality.
[refining, cracking]

Lessons

[None Reported]

1087609 November 1992

Source : ICHEME
Location : , FRANCE
Injured : 0 **Dead :** 6

Abstract

A series of explosions ripped through a catalytic converter at a refinery. The sound of the blast was heard 30 km away. Windows were shattered in the immediate area and blew in doors in a 5 km radius from the plant.
Six worker fatalities were reported in the initial explosion and fire, believed to have been killed when the control room collapsed. The estimated total cost of damage to the refinery at over a billion Ffr. (£100 million or $200 million) (1992).
It is thought that incident was caused by a gas leak in the plant's cracking unit which produces gasoline.
Some 250 firemen took more than three hours to extinguish the fire.
Together fire teams averted a major risk of pollution by the swift deployment of floating booms to prevent foam, chemicals and hydrocarbon products from polluting the nearby lagoon.
[fire - consequence, damage to equipment, spill, fatality, cracking equipment]

Lessons

[None Reported]

1085308 November 1992

Source : ICHEME
Location : , USA

Injured : - **Dead :** 0

Abstract

A fire occurred on an LPG loading rack. The incident occurred when an LPG loading hose pulled free of the railcar liquid fill valve shortly after loading had commenced. The LPG was 70% propylene, 30% propane, loading at more than 350 gpm at 300 psi.. Two cars were being loaded simultaneously.
There was a spill, and ignition occurred. As the fire dwindled, was taken not to extinguish the flame, to avoid forming another vapour cloud that could possibly re-ignite. The entire loading system contents including the piping and the two railcars was allowed to depressure and burn out, this took about 30 minutes.
Damage was confined to one loading rack and an LPG road tanker adjacent to the fire area. Physical injuries were minor.
[vapour cloud explosion, spark, fire - consequence, damage to equipment, rail transpor, gas / vapour release, injury]

Lessons

[None Reported]

5844 05 November 1992

Source : PROCESS ENGINEERING, 1992, NOV.
Location : Lostock; Northwich; Cheshire, UK

Injured : 0 **Dead :** 0

Abstract

Fire started in a drier and caused extensive damage to this plant that manufactured chlorinated rubber. A toxic cloud, believed to contain hydrochloric acid and phosgene, was released causing many people to stay indoors.
[heating]

Lessons

[None Reported]

5841 03 November 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JAN.

Location : Immingham; Humberside, UK

Injured : 0 **Dead :** 0

Abstract

Explosion in nos. 3 and 4 tank during unloading of crude oil from a marine tanker.

Lessons

[None Reported]

8292 November 1992

Source : ICHEME

Location : ,

Injured : 0 **Dead :** -

Abstract

An explosion occurred which caused major damage and fatalities. A series of explosions ripped through the refinery's catalytic converter believed to have been caused by a gas leak in the plant's cracking unit which produces gasoline. The basic cause was insufficient information from material received. Losses, multiple fatalities (when control room collapsed), damage to plant estimated at over a billion Ffr, $200 million (1992).
[environmental, damage to equipment, fatality, refining, cracking equipment]

Lessons

On Emergency Response:
Great value in exercise and visits between mutual aid companies together with local fire services.

5835 26 October 1992

Source : LLOYDS LIST, 1992, 27 OCT.; THE INDEPENDENT, 1992, 27 OCT.

Location : Sullom Voe, Shetland Islands, UK

Injured : 0 **Dead :** 0

Abstract

Fire in drier unit of the gas processing plant at a terminal. Substance involved: crude oil.
[fire - consequence, heating]

Lessons

[None Reported]

5829 22 October 1992

Source : ICHEME
Location : , USA

Injured : 7 **Dead :** 0

Abstract

A pipe ruptured at a fertiliser storage tank during the unloading of ammonia from a road tanker. Release of a thick white cloud forced the evacuation of 500 people.

Lessons

[None Reported]

5820 16 October 1992

Source : LOSS PREVENTION BULLETIN, 116, 9-13; ASAHI NEWSPAPERS; LLOYDS LIST, 1992, 17 OCT.
Location : Sodegaura; Chiba, JAPAN

Injured : 8 **Dead :** 9

Abstract

An explosion and subsequent fire took place at an oil refinery following shutdown for catalyst replacement work. The accident occurred when the process was returned to operation and approached normal operating conditions. The lock ring, the channel cover and a few other small parts of the feed/reactor effluent exchanger burst apart throwing debris more than a hundred metres, followed by a simultaneous explosion of the spouted hydrogen and a subsequent fire near the heat exchangers. A few minutes prior to the explosion, a loud major emission of hydrogen arose from the vent and drain holes and other locations of the failed exchanger. During shutdown for catalyst replacement, the feed/reactor effluent exchanges, including the failed unit were not subjected to internal inspection. Fatality.

After investigation the causes of this accident were found to be:

1. The gasket retainer had not been replaced in spite of diameter reduction to such an extent that it could over-ride the gasket groove.
2. The grinding repair performed on the gasket retainer at the last maintenance shutdown in 1991 was not appropriate and made over-riding easier.
3. There were no technical standards for the replacement of the internal flange set bolts that took into consideration the effects of bolt wear on the force and deformation of the lock ring.

As a background to 1,2, and 3, above, it has been emphasised that there was no clearly defined role for management of equipment maintenance between the user of the equipment and its fabricator, who conducted in-shop maintenance. This resulted in inadequate technical judgement.

[inspection inadequate, refining, fire - consequence]

Lessons

On the basis of knowledge obtained through this investigation, the committee has recommended measures to prevent recurrence of similar accidents. These are:

1. Users of the same kind of exchanger shall carry out inspection of the gasket retainer and lock ring and whether the gasket groove and relevant parts were subjected to repair in the past. This shall be conducted at next temperature/pressure down (by internal inspection, even if there are no plans for open inspection at the next shutdown). The most appropriate maintenance control of these items shall be made.
2. Users of the same kind of exchanger shall clearly specify role sharing for maintenance management when they place an order of inspection and maintenance to an equipment fabricator. This shall establish adequate maintenance organisations so as not to overlook any problems that could adversely affect safety.
3. Fabricators of the same kind of exchanger shall review existing criteria for replacement of the internal set bolts and shall make the results of the review available to users of the exchanger.
4. When conducting maintenance inspections, the exchanger fabricator shall clarify respective scope of work between the fabricator and the user so that the users are aware of their safety management responsibilities.

5819 15 October 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, DEC.
Location : Ignalina, LITHUANIA

Injured : 0 **Dead :** 0

Abstract

A crack on a small pipe in a cooling system caused leak of radioactive water. Plant shutdown and leak contained.
[radioactive release, spill]

Lessons

[None Reported]

5818 12 October 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JAN.
Location : Bahia Blanca, ARGENTINA

Injured : 0 **Dead :** 0

Abstract

A marine tanker struck a hose during unloading at a terminal spilling 600 tonnes of crude oil.

Lessons

[None Reported]

5815 08 October 1992

Source : THE CHEMICAL ENGINEER, 1992, 15 OCT.; LLOYDS LIST, 1992, 10,12, & 13 OCT., & 15 DEC.
Location : Wilmington; California, USA

Injured : 16 **Dead :** 0

Abstract

Massive explosion in refinery hydrogen processing unit was fuelled by light gases and gasoline. The fire was visible from 32 km away. People in a 5 sq km area were evacuated. Automatic shutdown valves failed to operate. Later reports indicated that the cause was corrosion of a pipe which was one eighth instead of five-eighths of an inch.
[evacuation, valve failure, refining, fire - consequence]

Lessons

[None Reported]

8342 October 1992

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Hydrocracker reactor effluent pipeline failure and fire at a refinery.
A 6 inch outlet elbow of a first stage reactor effluent air cooler failed, resulting in a fire. There was some damage to equipment. The presence of aqueous ammonium bisulphide resulted in erosion/corrosion that caused the pipeline failure. The cause was inadequate inspection for the detection of general and localised corrosion.
[fire - consequence, inspection inadequate, reactors and reaction equipment, cracking]

Lessons

An adequate inspection programme to detect general and localised corrosion/erosion attack is essential, coupled with a good recording system for all findings.

5796 28 September 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, NOV.
Location : Provo; Utah, USA

Injured : 0 **Dead :** 0

Abstract

Delayed explosion destroyed building after heating up of an emulsion was detected, equipment stopped and site evacuated. 4 saved by blast wall while being 75 metres away. Substance involved: nitrate salt.
[evacuation, chemical - nitrate]

Lessons

[None Reported]

5792 23 September 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, NOV.
Location : Ufa; South Urals, RUSSIA

Injured : 8 **Dead :** 0

Abstract

A powerful explosion in refinery damaged key facilities including compressor, pump, control units and an oil pipe system. Explosion occurred when gas leaked from a valve and ignited.
[damage to equipment, refining]

Lessons

[None Reported]

5789 22 September 1992

Source : LLOYDS LIST, 1992, 24 SEP.
Location : Novoufimskyufa, RUSSIA

Injured : 8 **Dead :** 0

Abstract

A powerful explosion at a refinery damaged large section of plant.
[fire - consequence, refining, damage to equipment]

Lessons

[None Reported]

5780 09 September 1992

Source : LLOYDS LIST, 1992, 19 SEP.
Location : Jurong, SINGAPORE

Injured : 0 **Dead :** 0

Abstract

A fire broke out at a crude distillation unit during start-up after a month's maintenance work had been completed. Fire was under control in half an hour. The fire started in a sewer.
[fire - consequence]

Lessons

[None Reported]

5771 01 September 1992

Source : THE CHEMICAL ENGINEER, 1992, 10 SEP.; LLOYDS LIST, 1992, 9 SEP., & 14 OCT.
Location : Eleusis; Elefsina; Athens; Greece, GREECE

Injured : 30 **Dead :** 14

Abstract

An explosion occurred in one of the crude units during a change of shifts. Cause attributed to corrosion of a steel pipe in the crude oil distillation column due to the collection of corrosive compounds during shut-down periods. 7 mm of pipe thickness had corroded away. Fatality.

Lessons

[None Reported]

5769 September 1992

Source : LLOYDS LIST, 1992, 22 OCT.; EUROPEAN CHEMICAL NEWS, 1992, 5 OCT.
Location : Gelsenkirchen, GERMANY

Injured : 2 **Dead :** 1

Abstract

A fire occurred during start-up after pygas leaked from a connection pipe in an olefin cracker plant. Fatality.
[fire - consequence, cracking]

Lessons

[None Reported]

5750 17 August 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, OCT.
Location : Guam, MARIANA ISLANDS

Injured : 0 **Dead :** 0

Abstract

An explosion occurred on a deck LPG pump during unloading of propane from a pressurised deck tank. Fire quickly extinguished.
[fire - consequence]

Lessons

[None Reported]

1080210 August 1992

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A day tank became overpressured, resulting in the release of approximately 24 tonnes of light polymer mixture to atmosphere. Nobody was injured. The plant had been shutdown.

The incident occurred when mixing liquid water with high temperature light polymer mixture. The resultant flashing of the water produced enough pressure to bevel the base of the tank by 4 inches and generate a 50 foot plume of light polymer mixture. The water is considered to have originated from the plant wash section which is flooded with condensate to displace all hydrocarbons when the plant is shutdown for a de-butaniser column wash.

All contaminated pipework was drained to removed all traces of water from the system.

The spread of light polymer mixture to the plant drains was minimised by tankfarm bund walls and the use of absorbent material as makeshift bunds. A clean up plan was formulated and put into action immediately. This did not, however, prevent the site combined effluent being out with consent at a level of 34 ppm total oil (consent = 30 ppm).

[overpressurisation, gas / vapour release, contamination]

Lessons

[None Reported]

5736 02 August 1992

Source : LLOYDS LIST, 1992, 8 AUG.
Location : Pickering; Lake Ontario, CANADA

Injured : 0 **Dead :** 0

Abstract

3000 litres of radioactive heavy water leaked from a cracked tube in a heat exchanger system causing shutdown of water treatment plant.
[tritium, radioactive release, plant shutdown, spill, heating, drains & sewers]

Lessons

[None Reported]

5723 23 July 1992

Source : ASSOCIATED PRESS; HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, OCT.
Location : Orem; Utah, USA

Injured : 0 **Dead :** 0

Abstract

Power supply failure while adding materials, trimethyl phosphite and methyl chloroacetate, to a vat stopped a mixer and the mixture overheated causing a release of vapours.
[overheating, agitation failure, gas / vapour release, mixing]

Lessons

[None Reported]

5722 23 July 1992

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1992.
Location : Punta Cardon, VENEZUELA

Injured : 0 **Dead :** 0

Abstract

A fire broke out in a catalytic cracking unit at the refinery. Substance involved: gasoline.
[catalytic cracker, fire - consequence, refining]

Lessons

[None Reported]

5711 11 July 1992

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 3RD QUARTER, 1992.
Location : , CURACAO

Injured : 0 **Dead :** 0

Abstract

A fire erupted in pipe rack near the centre of a refinery complex containing some 100 process lines. Several explosions caused by rupture of lines. Fire extinguished in 3 hours. Cause attributed to leak of crude oil from pipeline which ignited on hot steam main.
[refining, fire - consequence]

Lessons

[None Reported]

5706 08 July 1992

Source : LLOYDS LIST, 1992, 9,10, & 31 JUL.; CHEMICAL WEEK, 1992, 12 AUG.; EUROPEAN CHEMICAL NEWS, 1992, 13 JUL.; THE INDEPENDENT, 1992, 9 JUL.

Location : Uithoorn; Amsterdam, NETHERLANDS

Injured : 11 **Dead :** 3

Abstract

Incorrect identification of storage tanks led to the wrong materials being added to a reactor. Another report says the incident started with a small fire caused by a leak of boron trifluoride gas. The adjacent reactor exploded while the firemen were fighting this fire. Hundreds evacuated. Fatality.
[fire - consequence, evacuation, explosion, charging reactor, reactors and reaction equipment]

Lessons

[None Reported]

5702 02 July 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, AUG.
Location : Bombay, INDIA

Injured : 4 **Dead :** 3

Abstract

An explosion and fire occurred in the engine room of a marine tanker during loading of naphtha. Fatality.
[fire - consequence]

Lessons

[None Reported]

5693 24 June 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, AUG.
Location : Tenerife, CANARY ISLANDS

Injured : 4 **Dead :** 1

Abstract

A fire and explosion occurred at a refinery when gasoline vapours leaked during material transfer ignited by oven. Fatality.
[fire - consequence, refining]

Lessons

[None Reported]

5684 16 June 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, AUG.

Location : Houston; Texas, USA

Injured : 30 **Dead :** 0

Abstract

A pipe broke during road tanker loading operations leading to a spill of 350 litres of liquid sulphur dioxide.

Lessons

[None Reported]

5682 15 June 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, AUG.; LLOYDS LIST, 1992, 17 JUN.
Location : Antwerp, BELGIUM

Injured : 0 **Dead :** 0

Abstract

An explosion and fire occurred in desulphurisation unit at a refinery.
[fire - consequence, refining]

Lessons

[None Reported]

5679 14 June 1992

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A fire occurred at the continuous mixer extruder feed throat which extended to the fume vent system. A greasy wax coating was found in the vent duct.
[fire - consequence, extrusion]

Lessons

[None Reported]

5677 10 June 1992

Source : THE CHEMICAL ENGINEER, 1992, 25 JUN.
Location : Ferrara, ITALY

Injured : 2 **Dead :** 1

Abstract

An explosion occurred when workers were transferring chemical waste from an on-site operation to a biological treatment plant for liquid waste. Organic metal and hydrocarbon residue in the liquid waste was being unloaded and may have exploded on contact with air. Fatality.
[organic metal waste, unloading, material transfer]

Lessons

[None Reported]

5666 21 May 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, JUL.
Location : Grangemouth; Scotland, UK

Injured : 0 **Dead :** 0

Abstract

A leak developed on a marine tanker when loading polyethylene.
As a result of this the emergency services were called. The Fire Service sprayed water on the escaping vapour and sections of the surrounding dock areas, all ships crews were evacuated.
The tanker had approximately 650 tonnes of propylene gas in the effected tank.
The effected area was sealed off by the police, the wind was carrying the vapours to the west of the dock area.
Gas readings were taken from the area which showed low levels.
[instrument/controller, gas / vapour release, human causes]

Lessons

[None Reported]

1079430 April 1992

Source : ICHEME
Location : , UK

Injured : 0 **Dead :** 0

Abstract

A road transportation incident. During delivery of bulk polyethylene a silo computer locked out. The road tanker driver received no warning and was not able to shut off the donkey engine before damage to the engine occurred. Extensive repairs to the engine were necessary.
[loading, unloading, computer failure, silo/hopper, damage to equipment]

Lessons

[None Reported]

5647 29 April 1992

Source : THE CHEMICAL ENGINEER, 1992, 14 MAY.
Location : Schweizerhalle; Basel, SWITZERLAND

Injured : 1 **Dead :** 0

Abstract

An explosion and fire during the filtration of a pharmaceutical intermediate product.
[fire - consequence]

Lessons

[None Reported]

5641 22 April 1992

Source : LLOYDS LIST, 1992, 24 APR., & 25 APR., & 27,28 APR.; THE CHEMICAL ENGINEER, 1992, 30 APR.
Location : Guadalajara, MEXICO

Injured : 1460 **Dead :** 206

Abstract

An explosion occurred in a sewage system due to gasoline leakage from a refinery pipe into system and small amount of hexane. Gasoline leaked the previous day. Damage to 1100 buildings in a 20 block area. 25,000 people were evacuated.
[drains & sewers, damage to equipment, refining, evacuation, fatality]

Lessons

[None Reported]

8428 21 April 1992

Source : PROCESS SAFETY PROGRESS VOL 13, NO 3, JUL, 1994.
Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

45 lb of hydrogen cyanide was released causing the evacuation of the production unit, the adjacent shop and another unit. An investigation was carried out which involved a detailed analysis of the possible causes of the release. The initiating event was the failure of a utility water supply for the distillation column. [gas / vapour release, utility failure]

Lessons

1. The lack of diagnostic guide and emergency operating instructions for both the HCN process unit and the cooling tower.
2. Lack of procedures and documentation for the cooling tower make-up water.
3. Lack of interlocks to shutdown key HCN equipment on high refrigerated water temperatures.

5630 12 April 1992

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 2ND QUARTER, 1992.
Location : Karlsruhe, GERMANY

Injured : 0 **Dead :** 0

Abstract

A fire occurred in a refinery's power plant resulted in the shutdown of a catalytic cracker and other upgrading units. No disruption of crude units.
[plant shutdown, fire - consequence, refining, cracking]

Lessons

[None Reported]

5622 05 April 1992

Source : LLOYDS LIST, 1992, 22 MAY.
Location : Port Arthur; Texas, USA

Injured : 0 **Dead :** 0

Abstract

A fire in a crude oil distillation unit was brought under control in 30 minutes.
[fire - consequence]

Lessons

[None Reported]

5618 02 April 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, JUN.

Location : Chesapeake; Virginia, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred in a fertiliser warehouse while ammonium sulphate was being loaded into ship.
[warehousing, fire - consequence, loading]

Lessons

[None Reported]

5235 April 1992

Source : ICHEME
Location : ,
Injured : 0 **Dead :** 0

Abstract

In April 1992, an operator detected two leaking flanges at joints in the overhead transfer line at a catalytic cracker reactor.
Measures taken to avoid ignition were successful.
In August 1991, a hydrocarbon leak was detected on the overhead system. The leak was repaired, however, during the installation, thermal lagging was erroneously applied over the flanges and their bolts on the two inlet nozzles of the reactor.
The basic cause for the leakage can be attributed to covering the flanges with thermal insulation. This was done for the whole of the reactor overhead transfer line at the August, 1991, repairs. This allowed the flange bolts to reach temperatures close to the process ones (approximately 515 degrees C), and at this temperature the bolt material of 21Cr/Mo/V 57, enters the yielding area (stress relaxation). With increasing service time, material elasticity is lost as follows:
Length of exposureRemaining Tension
1,000 hours of service50%
10,000 hours of service25%
In this way the flange surface pressure is reduced after a given service time to below-the-design requirements, and a leak will result. In this case the service time was approximately 5,500 hours.
After removing the insulation from the flanges, and successively replacing all the bolts and raising their tension (to about 75% compared to room temperature), both flanged joints became tight again.
Insulation on all flanges in the reactor overhead transfer line, and flange connections to that line, was removed.
[reactors and reaction equipment, flange leak, cracking]

Lessons

According to Quantitative Risk Assessment (QRA), flanges in such hot services should not be covered by thermal insulation, because:
1. Bolts can reach temperatures close to the process temperature, with high temperatures increasing the probability of leakage due to bolt stress relaxation.
2. The severity and extent of damage is higher in the case of leakage under thermal insulation, since the leaked product can spread unnoticed and be absorbed by the insulating material.
Heavy oils being transferred in thermal insulated piping presents a very high risk of fire in case of leakage since they flow at temperatures higher than their auto-ignition temperatures (over about 200 degrees C).

5613 30 March 1992

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A small phosphorus fire occurred as a result of a pinhole in a pipe at a rail car unloading station. The pipe leaked due to severe corrosion.
[fire - consequence]

Lessons

[None Reported]

5609 24 March 1992

Source : LLOYDS LIST, 1992, 7 APR.; HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, MAY.
Location : Dakar, SENEGAL

Injured : 403 **Dead :** 90

Abstract

An explosion and fire occurred in an ammonia storage tank at a peanut processing factory while loading the tank from a road tanker. Tank believed to have been overfilled. Lack of breathing apparatus hampered rescue. Fatality.
[overflow, fire - consequence, gas / vapour release]

Lessons

[None Reported]

5588 23 February 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, MAY.
Location : Kwangiu, SOUTH KOREA

Injured : 0 **Dead :** 0

Abstract

A road transportation incident. Explosion and huge fire occurred after brake failure caused truck unloading LPG to reverse into storage tank. 3 gas storage tanks ablaze. Led to the evacuation of 20,000 people.
[road transport, brakes faulty, fire - consequence]

Lessons

[None Reported]

1046218 February 1992

Source : ICHEME
Location : ,
Injured : 0 **Dead :** 0

Abstract

A fire occurred on a mill break. An operator noticed the mill running and went to turn it off. When he got to the start-stop station which is near the mill break he noticed that the break was cherry red. He tried to stop the mill but it would not stop so he pulled the emergency break and it still did not stop, but the air to the break came out through a hole in the break bladder bursting into flames and fanning the fire. Several fire extinguishers were used, but could not put out the fire. The reset button was pushed for the break which turned off the air and fire was easily extinguished. The operator was sent to the electric service room to turn off the power to the mill motor and noticed that one of the red and green indicating lights that are on the front of the 5000 volt switch gear were lit. He tried to trip the 5000 volt mill breaker, but it did not trip, so he backed it out from the buss bars to assure that there was no power to the mill motor. The mill motor stopped.

The following cause of the incident was found:

The 5000 volt switch gear is both energised and de-energised by 48 volt DC power to the battery system. The breaker that supplies power to the battery charger either tripped or was accidentally turned off. Power from the batteries was all used up and the batteries went dead as indicted by the red and green lights being off. When the mill operator tried to stop the mill there was no battery power left to turn the mill motor off. The break was on, but because power to the motor was on too, the motor kept running, quickly heating up the break and causing the fire.

[fire - consequence, mechanical equipment failure, milling, solids processing equipment]

Lessons

The following recommendations were made:

1. Install a lock clip on the breaker that powers the battery charger to prevent accidentally tripping the breaker.
2. Clearly label all breakers to ensure that people know which breaker powers which equipment.
3. Install an alarm to sound if incoming power to the battery charger is turned off.
4. Install a meter to indicate the status of the batteries and an alarm to sound if the batteries get low.

1307 10 February 1992

Source : ICHEME

Location : ,

Injured : 3 **Dead :** 1

Abstract

On February 10, 1992, in a fire at a chemicals site, a contractor's employee was fatally injured and three other contractor workers seriously injured.

The fire broke out at one of two storage spheres under construction in a tank farm close to the docks and at some distance from the main factory. The 60 feet (18.3m) high spheres had not been commissioned. A crew of 8 men were working on the sphere when the fire broke out, 4 of which escaped without serious injury.

Preliminary findings indicate that the fire probably started near the base of a sphere, under weather protection sheeting.

The sphere insulation programme used combustible materials - plastic wrapping to protect the scaffold boards from overspray, wooden scaffold boards, and the polyurethane cold insulation covering the bottom 25% of the spheres external surface. These materials were able to sustain a fire.

There is also evidence to suggest that the polyurethane foam may have burned and released vapours which, together with the other combustible construction materials present, carried rapid escalation of the fire to the top of the sphere.

Two halogen lamps and their wiring were found at the base of the sphere.

[fire - consequence, storage tanks, refining, fatality, injury, gas / vapour release]

Lessons

Any site engaged in the application, restoration, or inspection of potentially flammable insulation materials must assess the fire hazards of the involved work place, consider the consequences of fire, and ensure that the appropriate avoidance, prevention and mitigation measures, including emergency plans, are established.

5552 21 January 1992

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 1ST QUARTER, 1992.
Location : Moscow, RUSSIA

Injured : 0 **Dead :** 0

Abstract

A fire occurred on the 25 metre vacuum distillation column of refinery.
[fire - consequence, refining]

Lessons

[None Reported]

5548 13 January 1992

Source : ICHEME

Location : ,

Injured : 2 **Dead :** 0

Abstract

Centrifuge feed tank exploded during a cleaning operation. The rupture was caused by steam pressure due to heat from the chemical reaction of an alkaline catalysed polymerisation of hydrogen cyanide. The hydrogen cyanide came from a decomposition of a product.

Lessons

[None Reported]

7581 09 January 1992

Source : LOSS PREVENTION BULLETIN, 107, 17-20.
Location : ,

Injured : 0 **Dead :** 0

Abstract

An incident occurred in the regenerator section of a Fluid Catalytic Cracker Unit (FCCU) 50 hours after a unit shutdown. The shutdown was not planned and was caused by mechanical failure of the regenerator airblower.
FCCU regenerators are large vessels containing beds of fluidised catalyst in which air is used to burn off both carbon, referred to as coke, and hydrogen based material trapped in and on aluminium silicate catalyst which has a porous structure. The air flows into the regenerator through a two, tier air grid system from an airblower.
Two days before the incident, the airblower tripped out due to activation of the airblower vibration shutdown monitoring equipment. The vibration was caused by a mechanical failure of one of the air blower rotor discs.
This initiated automatic shutdown of the unit. As a result the regenerator fluidised bed slumped and steam was automatically injected into the catalyst bed.
The air blower rotor assembly was inspected through a small manway inspection door, visually confirming that the rotor was damaged and would have to be repaired. At the same time the decision was taken to enter the regenerator/riser/reactor circuit to undertake other necessary repair work.
Over the subsequent 2 days operations staff prepared the regenerator for manway removal. It was recognised that catalyst temperature would be higher than usual. Previously when the air blower had tripped and the manways to the regenerator, riser/reactor and ductwork, including the waste heat boiler (known as the cat circuit) had been opened, the equipment had been gas tested and entered without incident. During the preparations a large butterfly valve and a critical flow nozzle were removed from the ductwork to the flue. These were normal procedures in preparing the cat circuit for entry. The removal of these items reduced the draught of the flue on the regenerator and would have contributed to an oxygen deficiency in the regenerator.
After all the necessary blinds had been inserted, operational procedures permitted the regenerator manways to be removed to allow the final vacuum truck removal of remaining catalyst.
On the day of the incident, work commenced to remove one of two manways on the regenerator, at the base about 9 m above ground level. A small manway was opened first to ensure that there was not a residual mound of hot catalyst resting against the large manway door that might have slumped onto those on the access platform. This manway was opened as the system was considered to be an air system open to atmosphere by virtue of the flue connection.
Work then proceeded to open the large 1.5 m manway. With one bolt remaining on the large manway, some witnesses reported a rumbling noise inside the regenerator. It was immediately followed by an orange-red flash which came out of the left side of the manway, from where the penultimate bolt had been taken.
Simultaneously a flame front and hot particles exited from the small manhole on the other side of the regenerator platform.
The flame and pressure front passed through the regenerator into the downstream flue ductwork. Where the duct was broken and plant items removed flame fronts and hot catalyst exited.
After a period of a few seconds, there was a louder secondary noise which emanated from the waste heat boiler and associated flues which sustained structural damage.
The following conclusions were made:
This unique incident was due to the ignition of hydrogen, light hydrocarbon gases and carbon monoxide. These gases were generated by contact of unregenerated catalyst with steam in an oxygen deficient atmosphere. Removal of a manway to allow access for vacuum truck removal of catalyst allowed oxygen re-enrichment of the internal atmosphere and the re-establishment of conditions that permitted ignition. Lighter-than-air combustible gases were trapped in a reservoir created by the internal configuration of the plant. The opening of the manway caused some gases to be dispersed into the ductwork prior to the ignition.
[catalytic cracker, blower failure, fire - consequence, oxygen enrichment, fluid cracker]

Lessons

[None Reported]

3151 08 January 1992

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A rail transportation incident. An LPG loading hose pulled free of a rail tanker liquid fill valve shortly after loading commenced. The resulting spill ignited. When loading began the connection began to leak, and when an operator tried to close up the leaky connection, the coupling gave way and blew out. Examination of the steel coupling revealed flattened and damaged threads. In addition the operator had only been with the company for 6 months and had no previous operating experience and did not follow guidelines for loading LPG railcars.
[operator error]

Lessons

Perform regular inspection of hoses, couplings, bonding systems, etc. Adequate provision should be available for safe shut down of LPG systems without presenting hazards to personnel.

940 07 January 1992

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

On January 7, 1992, an operator discovered that the bunded area of Tank A was flooded with product.
At the time, a portable, diesel driven centrifugal pump was connected by hoses to tanks A and B to allow lowering of Tank A, so that work could be done on its level indicator.
The operator immediately shut off the lowering line from Tank A and called for assistance.
Fire crews and vacuum tanker were mobilized to pump out the bund.
A gas test in the area revealed an LEL of no greater than 25%, and a decision was made by the Shift Supervisor not to declare a refinery emergency. With the fire crew on standby, removal of the spilled product commenced at 20.10 hours. Of the estimated 50,000 litres spilled, some 40,000 litres were recovered.
The release occurred due to the failure of one of the suction hoses to the centrifugal pump. The investigation revealed that neither the hoses nor the coupling were suitable for hydrocarbon service and that potential hazards are associated with this type of pump. It was also found that there were no written procedures available for setting up and operating temporary pump-over facilities.
[hose failure, refining, design or procedure error]

Lessons

1. Procedures should be prepared, giving clear instructions on what equipment is to be used for fluid transfers involving hydrocarbons.
2. In this case no clear distinction has been made in procedures between hydrocarbon transfers and general duties such as pumping out sumps and sewer boxes - instructions should be issued stating that, whenever possible, only PSI tested and marked (in date) hoses are to be used for hydrocarbon transfers, and that air driven or manual start diesels are to be used.
3. Hose connections should be flanged to ANSI standards or be camlock couplings with an approved hydrocarbon resistant seal (e.g., nitrile); aluminum couplings not to be used on caustic service.
4. If hire equipment is ever to be used for hydrocarbon duty, it should be specified by a competent person and inspected and tested by PIS before a permit for use is issued.
5. There is a need to review the requirement to do pump-overs, especially those relating to product movements, eliminating all non-maintenance related pump-overs. If analysis justifies continuation of pump-overs then at least one set of suitable hydrocarbon resistant hoses and an approved pump should be held for emergencies.

5536 03 January 1992

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, APR.
Location : Cook Inlet; Alaska, USA

Injured : 0 **Dead :** 0

Abstract

Transportation. Heating device failure led to the freezing of a mix of water and oil which ruptured the pipeline spilling 64 000 litres of oil.
[heating equipment, equipment causes]

Lessons

[None Reported]

5532 January 1992

Source : LLOYDS WEEKLY CASUALTY REPORTS 287/2
Location : Pembroke; Dyfed, UK

Injured : 15 **Dead :** 0

Abstract

Two fireball explosions ripped through a steel vessel striking the workers carrying out maintenance. The two explosions at this catalytic cracker plant were heard several miles away. The accident occured when 30 men were working inside the 40 ft diameter regeneration vessel which had been emptied whilst repairs were being carried out. Production not affected.
[cracking, reaction vessel]

Lessons

[None Reported]

8507 1992

Source : LLOYDS LIST, 1995, FEB, 9.
Location : San Francisco Bay, USA

Injured : 0 **Dead :** 0

Abstract

A company agreed to pay $2.2 million (1992) to settle lawsuit regarding discharge of selenium to the sea from its refinery.
[pollution, refining]

Lessons

[None Reported]

5529 1992

Source : LOSS PREVENTION BULLETIN, 120, 3-4.

Location : ,

Injured : 0 **Dead :** 0

Abstract

In an organic chemical plant, a hydroextractive distillation column produced hot water at the bottom of the column. This hot water was used to wash out a fertiliser plant where hot work, welding, was taking place. A factory steam and power failure caused organic material to exit from the column base and to be released from the drains of the fertiliser plant where it was ignited by the welding operation.

[steam failure, power supply failure, fire - consequence, chemical - organic]

Lessons

[None Reported]

110281992

Source : CHEMICAL HAZARDS IN INDUSTRY, JUNE, 1999, ISSN 0265-5271,; (CHEM AND PROCESS ENG. DEPT., UNIV. GENOA, ITALY),; LOSS PREVENTION BULLETIN, FEB 1999, (145), 11-15.

Location : ,

Injured : 0 **Dead :** 0

Abstract

Different accident analysis methods were used to investigate an explosion in the loading section of an acetylene production plant, in which the shock waves and missile effect involving 56 cylinders caused extensive impact damage to equipment and windows. A multi-step method methodology using experimental and theological studies was developed to define the sequence of events and identify the direct cause of the incident. The line to the cylinder loading rack was filled with acetylene due to a faulty valve and a black deposit was present in the line of a compressor. Local superheating took place causing a deflagration, resulting in failure of part of the line and a second explosion in the loading area. Fault tree analysis showed a combination of human error, valve failure and flame-flow arrestor failure combined with poor maintenance and deficient control instrumentation.
[damage to equipment, human causes]

Lessons

Recommendations are made for improving the safety of such systems.

8727 1992

Source : ICHEME
Location : , USA

Injured : 0 **Dead :** 0

Abstract

An aqueous solution was unloaded from a deck tank into tote bins. The deck tank was pressured with nitrogen to 20 psig and top loading of the bin was used. At the time of the incident, the unloading was nearly completed and nitrogen was flowing through the pipework. The operator noticed 6 inch sparks between the metal straps on the tote and the metal lid which holds the dip pipe and the vent.
The cause was the build up of static electricity on an unearthed vessel.
Generation took place while nitrogen was flowing with mist as normally a gas flow would not cause static. The static charge collected on the liquid and since the tote was lined with polyethylene it was not readily dissipated. The accumulation of charge on the inside of the tote induced a charge on the metal frame in contact with the liner. Since the frame was not well earthed it discharged to the pipeline.
[corrosive solution, processing, material transfer, loading, packaging equipment, tote, static discharge, unsafe condition, plant / property / equipment]

Lessons

Since the corrosive solution was not flammable the consequences were not serious. The easiest way to prevent static charges is to earth the pipeline, the tote and the weigh scale.

5511 19 December 1991

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 1ST QUARTER, 1992.
Location : Texas City; Texas, USA

Injured : 6 **Dead :** 0

Abstract

A fire occurred in the ultraformer process unit of refinery.
[fire - consequence, refining, processing]

Lessons

[None Reported]

5504 10 December 1991

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1992, FEB.; LLOYDS LIST, 1991, 13 DEC., & 1992, 2 JAN.
Location : Scholven; Gelsenkirchen, GERMANY

Injured : 8 **Dead :** 0

Abstract

An explosion occurred in a hydrocracker complex caused fire.
[fire - consequence, cracking]

Lessons

[None Reported]