

1258215 July 2100

Source : DUST EXPLOSIONS IN THE PROCESS INDUSTRIES. ECKHOFF.

Location : Fonda, Iowa, USA

Injured : 0 **Dead :** 0

Abstract

Electrical welding on a bucket elevator lead to a dust explosion in the elevator, which was passed to another. The damage was estimated at US\$ 0.03 million (1980).

[damage to equipment, safety procedures inadequate]

Lessons

The bucket elevators needed explosion relief

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, DECEMBER 13, 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 perform 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 : Colonie, New York, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a repair facility causing severe structural damage to the building and equipment. Several explosions resulted from the fire. The remains of two tanks were found approximately 2,000 yards away. Fortunately no one was injured in the incident.

An investigation is underway into the cause of the fire.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

1020912 December 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, DECEMBER 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 perform 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 : Hansville, USA

Injured : 0 **Dead :** 0

Abstract

A safety disc on a vessel ruptured releasing a cloud of hydrochloric acid. Fortunately no one was injured in the incident. An investigation into the build up of pressure within the vessel is underway.

[overpressurisation, bursting disc failure, gas / vapour release]

Lessons

[None Reported]

Source : CHEMICAL & ENGINEERING NEWS, DECEMBER 4, 2000.

Location : , SINGAPORE

Injured : 0 Dead : 0

Abstract

A fire occurred on a CO plant causing total shutdown. The cause of the incident is not known. An investigation into the incident is underway. Fortunately no one was injured in the incident and only minor damage occurred.

[fire - consequence, plant shutdown]

Lessons

[None Reported]

1317026 October 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, OCTOBER 27, 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 perform 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 : Richmond, USA

Injured : 0 **Dead :** 1

Abstract

An explosion and fire occurred at a plastic recycling plant killing a worker and forcing the evacuation of nearby businesses and residents as toxic fumes were released to atmosphere.

Damage to the building is estimated to be \$2 million (2000).

[fire - consequence, fatality, gas / vapour release, damage to equipment]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, OCTOBER 22, 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 perform 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 : Downey, USA

Injured : 6 **Dead :** 0

Abstract

An explosion occurred at a bottling plant injuring six workers. The incident occurred due to leak on a 1,100-gallon tank containing propane, which is thought to have been ignited by a water heater. The fire was extinguished in forty-five minutes. Nearby buildings within half a mile were damaged by the blast.
[hot surface, damage to equipment, injury]

Lessons

[None Reported]

1315112 October 2000

Source : CHEMICAL WEEK, OCTOBER 18, 2000.

Location : Wiesbaden, GERMANY

Injured : 7 **Dead** : 0

Abstract

An explosion and fire occurred on a resins plant causing severe damage to the plant. Seven people including fire fighters were injured in the incident.

An investigation into the cause of the incident is underway.

[fire - consequence, damage to equipment, injury]

Lessons

[None Reported]

Source : <http://www.edie.net/news/Archive/3387.html>

Location : Kentucky, USA

Injured : 0 **Dead** : 0

Abstract

Approximately 250 million gallons of water mixed with 155,000 cubic yards of coal wastes spilled into a stream after an unexpected underground mine collapsed. The stream runs into major rivers and there are fears of an environmental disaster.

An estimated 30,000 people are without water and local wildlife has been affected.

A major clean up and investigation is underway.

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, OCTOBER 4, 2000, (<http://www.chemsafety.gov>).

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Location : Albany, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a titanium processing plant. The fire occurred on a pipe carrying chlorine gas causing damage. A nearby residential area was evacuated. The fire was brought under control and the leak stopped in about thirty minutes. No injuries were reported.

[fire - consequence, damage to equipment, evacuation]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, OCTOBER 6, 2000, (<http://www.chemsafety.gov>).

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Location : Soda Springs, USA**Injured :** 0 **Dead :** 0**Abstract**

A fertiliser plant was shutdown after a phosphoric tank was found to be leaking. The cause of the leak is not known. An investigation is being carried out into the cause. No one was injured in the incident.

[plant shutdown]

Lessons

[None Reported]

1319803 October 2000

Source : BBC NEWS, 3 OCTOBER 2000, (<http://www.bbc.co.uk>).

Location : , SINGAPORE OFFSHORE

Injured : 0 Dead : 0

Abstract

A marine transportation incident. An oil tanker containing over 40,000 tonnes of crude oil released 7,000 tonnes of the product into the sea after running aground.

There are reports of no injuries but four cargo tanks have been damaged in the incident. A 300-meter boom is being used to contain the spill and to prevent more oil from escaping.

[marine tanker, damage to equipment, ship ran aground]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, OCTOBER 2, 2000, (<http://www.chemsafety.gov>).

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Location : Madison, USA

Injured : 1 **Dead :** 0

Abstract

An explosion and fire occurred at a recycling plant. The building was destroyed in the incident.

It is reported that several explosions occurred from propane tanks that were nearby.

One fire fighter was injured in the incident.

An estimated \$3 million (2000) worth of damage occurred.

[fire - consequence, damage to equipment, injury]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, NOVEMBER 2000.

Location : Urumqi, Zinjiang, CHINA

Injured : 300+ **Dead** : 60

Abstract

A road transportation incident. An explosion occurred on a truck carrying explosives for disposal. The incident occurred due to an uneven road causing excessive vibration. Sixty people were killed and more than three hundred injured in the incident. A nearby residential area was damaged.
[fatality, injury, damage to equipment]

Lessons

[None Reported]

1301821 August 2000

Source : CNN.COM, U.S. NEWS, AUGUST 19, 21, 2000, (<http://www.cnn.com>).

Location : New Mexico, USA

Injured : 5 Dead : 11

Abstract

An explosion and subsequent fire occurred on a 30-inch underground natural gas pipeline reportedly killing eleven people and injuring at least five others.

An investigation into the rupture has revealed that a corroded section of the pipe was ejected in the explosion.

[fire - consequence, fatality, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, AUGUST 22, 2000, (<http://www.chemsafety.gov>).

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Location : Texarkana, Texas, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at an ammunitions plant. The fire destroyed and severely damaged parts of the plant. No one was injured in the incident. Workers were evacuated from the facility.

[fire - consequence, evacuation, damage to equipment]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, AUGUST 18, 2000, (<http://www.chemsafety.gov>).

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Location : Convent, USA

Injured : 9 **Dead :** 0

Abstract

A fire and explosion occurred at a refinery injuring nine workers; one who was severely burned was taken to the burn unit at the nearby hospital. Minor damage occurred to the refinery.

The cause of the incident is being investigated.

[fire - consequence, burns, damage to equipment, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, AUGUST 18, 2000, (<http://www.chemsafety.gov>).

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Location : Columbia, USA

Injured : 1 **Dead :** 0

Abstract

A fire occurred in a laboratory severely burning a student. The incident occurred after a mixture of two unknown chemicals caught fire. The building was evacuated as a precaution.

The fire caused an estimated \$12,000 (2000) worth of damage.

[fire - consequence, laboratory work, unwanted chemical reaction, burns, evacuation, damage to equipment, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARDS INVESTIGATION BOARD, AUGUST 14, 2000, (<http://www.chemsafety.gov>).

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Location : Honolulu, USA

Injured : 1 **Dead :** 0

Abstract

A plant was shut down due to an accidental mixing of two incompatible chemicals causing a release of approximately 20 pounds of chlorine gas. The incident occurred when an operator accidentally pumped sodium hypochlorite, bleach, into a 200-gallon storage tank containing phosphoric acid. The operator was injured in the incident.

[plant shutdown, people, gas / vapour release, storage tanks, normal operations, injury]

Lessons

[None Reported]

1297410 August 2000

Source : CNN.COM, U.S. NEWS, AUGUST 10, 2000, (<http://www.cnn.com>).

Location : Texas, USA

Injured : 0 Dead : 3

Abstract

A support beam collapsed on a lake construction site dragging three workers underwater. The workers were clipped to the top of the concrete column when it collapsed. The entire structure toppled into waters 40 to 60 feet deep and approximately 50 feet off the shore. The column was to support a pumping station for a water pipeline.

[fatality]

Lessons

[None Reported]

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

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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]

Source : CHEMICAL SAFETY AND HAZARDS INVESTIGATION BOARD, AUGUST 8, 2000, (<http://www.chemsafety.gov>).

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Location : Temple, Texas, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a warehouse causing serious damage and the evacuation of the surrounding area due to hazardous smoke being emitted. The fire destroyed several power transformers leaving nearby businesses without power.

An estimated forty million gallons of runoff spilled into a nearby creek and was reported to have killed a number of fish.

[fire - consequence, damage to equipment, warehousing, gas / vapour release, ecological damage]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARDS INVESTIGATION BOARD, AUGUST 7, 2000, (<http://www.chemsafety.gov>).

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Location : Pheonix, USA

Injured : 5 **Dead :** 0

Abstract

A fire occurred at a chemical supply warehouse releasing clouds of toxic smoke. Approximately 100 people were evacuated from the surrounding area. The warehouse stored pesticides, fertilisers, and plastics and possibly cyanide. Five fire fighters were taken to hospital for treatment for exhaustion and smoke inhalation. The fire damaged other businesses in the area. Damage to the warehouse is to be estimated at \$100 million (2000).

[fire - consequence, warehousing, damage to equipment, injury, gas / vapour release]

Lessons

[None Reported]

Source : BBC NEWS, 2 AUGUST, 2000, (<http://www.bbc.co.uk>).

Location : Taketoyo, JAPAN

Injured : 56 Dead : 0

Abstract

An explosion occurred in a gunpowder warehouse of a chemical factory injuring fifty-six people. The warehouse was completely destroyed and damage occurred to the surrounding residential area.

The explosion occurred in a store room containing several tonnes of gunpowder.

An investigation is being carried out into the cause of the explosion.

[black powder (gunpowder), warehousing, damage to equipment, fatality, people, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, AUGUST 1, 2000, (<http://www.chemsafety.gov>).

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Location : Convent, USA

Injured : 0 **Dead :** 0

Abstract

An explosion occurred at a phosphate plant. The incident occurred when a 12 inch line carrying processed gas exploded and caught fire an hour after the plant began to shutdown.

Damage is thought to be minor.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, AUGUST 1, 2000, (<http://www.chemsafety.gov>).

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Location : Dayton, USA

Injured : 0 **Dead :** 0

Abstract

An explosion occurred at chemical company tearing a hole in the roof of the building. Fortunately no one was injured.

The company uses hydrofluoric acid and anhydrous ammonia in the manufacture of nitrogen trifluoride, used as a cleaning agent in the computer industry.

[damage to equipment, processing]

Lessons

[None Reported]

1286823 July 2000

Source : BBC NEWS, 23 JULY, 2000, (<http://www.bbc.co.uk>).

Location : Staffordshire, UK

Injured : 0 **Dead** : 2

Abstract

Two contractors were killed when a 100-metre kiln they were demolishing collapsed.

The incident occurred as the contractors were salvaging bricks. It is thought that they were cutting away a metal structure when the kiln collapsed.

An investigation into the incident is being carried out.

[demolition, fatality]

Lessons

[None Reported]

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

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Location : Quebec, CANADA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a tire shop in a non-residential area. Approximately 100 fire fighters attended the blaze. Propane tanks were moved away from the building out of danger.

An estimated \$300,000 worth of damage occurred.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

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

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Location : Oklahoma City, USA

Injured : 1 **Dead :** 0

Abstract

A fire occurred at a propane warehouse completely destroying the building and threatened a storage tank containing 4,000 gallons of fuel. One worker was injured in the incident.

[fire - consequence, warehousing, damage to equipment, storage tanks, cylinder, burns, injury]

Lessons

[None Reported]

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

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Location : Montvale, USA

Injured : 1 **Dead :** 0

Abstract

A road transportation incident. A tank truck was in collision with a road vehicle causing the release of 1,500 gallons of gasoline to be spilled. The spill caused soil contamination. Gas fumes overcame one fire fighter.

A quick response prevented the gasoline from entering the sewer system.

[gas / vapour release, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JULY 10, 2000. (<http://www.chemsafety.gov>).

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Location : Hadtings, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a agricultural chemical warehouse that stored farm products, pesticide and herbicide chemicals. A dike was dug round the building to stop any chemicals spilling.

The warehouse was completely destroyed in the fire. There are no reports of injuries.

[fire - consequence, storage, damage to equipment]

Lessons

[None Reported]

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]

1274202 July 2000

Source : CNN.COM, U.S. NEWS, JULY 2, 2000, (<http://www.cnn.com>).

Location : Lake Erie, USA

Injured : 75+ Dead : 1

Abstract

One person was killed and seventy-five others injured when a 25-foot diameter section of concrete and steel flooring on a terrace collapsed at a winery.
[fatality, fall, material of construction failure, injury]

Lessons

[None Reported]

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 within 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]

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

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Location : Beauregard Parish, USA

Injured : 0 **Dead :** 0

Abstract

A fire and explosion occurred at a crude oil well destroying several pieces of equipment. The well was being overhauled to bring back into production at the time of the incident. No one was injured.

The well did not explode or catch fire.

An investigation is being carried out into the cause of the incident.

[fire - consequence, maintenance, damage to equipment]

Lessons

[None Reported]

Source : CNN.COM, U.S. NEWS, JUNE 26, 2000, (<http://www.cnn.com>).

Location : Los Alamos, USA

Injured : 0 Dead : 0

Abstract

Truckloads of contaminated soil two miles from a reactor one used in nuclear weapons research and manufacturing is being moved to a waste storage site due to seasonal heavy rains, which could cause flooding in an area that has been affected by fire.

The operation is being carried out, as there's little or no vegetation to slow water or stop sediment from pouring into the areas canyons that lead to a main river. [excavation, contamination, preventative measures]

Lessons

[None Reported]

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]

Source : CNN.COM, U.S. NEWS, JUNE 22, 2000, (<http://www.cnn.com>).

Location : Texas, USA

Injured : 0 Dead : 0

Abstract

Two window cleaners were left hanging approximately 100 feet in the air when scaffolding they were using collapsed. Fortunately no one was hurt in the incident.

[cleaning]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JUNE 15, 2000, (<http://www.chemsafety.gov>).

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Location : Blue Ash, USA

Injured : 6 **Dead :** 0

Abstract

A flash fire was triggered when a hydraulic fluid leak occurred near a series of electrical switches.

The incident occurred when a worker dropped a mold used in the manufacturing process, the mold hit the hydraulic fluid line causing it to spring a leak. Six workers were affected by smoke.

Slight damage occurred to equipment.

[fire - consequence, flashover, damage to equipment, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JUNE 15, 2000, (<http://www.chemsafety.gov>).

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Location : Smyrna, Georgia, USA

Injured : 0 **Dead :** 0

Abstract

An explosion occurred on a tank containing benzoyl peroxide at a chemical plant. No one was injured in the incident. Damage to the building is estimated at \$100,000 (2000).

[damage to equipment]

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]

Source : CHEMICAL WEEK, JUNE 7, 2000

Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

A rail transportation incident. A rail car derailed and crashed into pipelines carrying crude oil, gasoline, methanol and natural gas. Damage to the pipelines occurred but no release was reported.

Repairs could take up to three weeks to complete.

[damage to equipment, derailment]

Lessons

[None Reported]

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

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Location : Ontario, CANADA

Injured : 0 **Dead :** 0

Abstract

A 42-inch pipeline ruptured releasing natural gas. The incident occurred during pressure testing. The gas was quickly turned off and there was no danger to the environment.

[pipeline failure, near miss]

Lessons

[None Reported]

Source : CHEMICAL & ENGINEERING NEWS, JUNE 5, 2000.; CNN.COM, U.S. NEWS, MAY 31, 2000, (<http://www.cnn.com>); CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, MAY 31, 2000, (<http://www.chemsafety.gov>)

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Location : Eunice, USA

Injured : 0 **Dead :** 0

Abstract

A rail transportation incident. Approximately 3,000 nearby residents were evacuated when a freight train derailed. One of the derailed cars contained flammable and toxic toluene diisocyanate another contained acrylic acid. Demolition experts set explosives on the pressurised tankers as handling them would be safer if the toxic substances inside were burned off. Damage occurred to 1,200 feet of rail track and a 189 foot bridge. No injuries occurred from the incident.

[derailment, fire - consequence, explosion, evacuation, damage to equipment, flammable chemical]

Lessons

[None Reported]

Source : CNN.COM, U.S. NEWS, 26 MAY, 2000, (<http://www.cnn.com>).

Location : North Carolina, USA

Injured : 100+ Dead : -

Abstract

It is thought that a chemical compound corroded steel cables within a concrete pedestrian walkway, causing it to collapse. More than 100 people were injured in the incident.

It is not known how calcium chloride entered the grout, which was used in the construction of the 320-foot long walkway.

[material of construction failure, collapse, injury]

Lessons

The following recommendation was stated:

The use of chlorides in prestressed concrete structured permits rust to form more easily when moisture is present.

Source : BBC NEWS, 21 MAY, 2000, (<http://www.bbc.co.uk>).

Location : London, UK

Injured : - **Dead** : 3

Abstract

A crane collapsed during construction work killing three workers. The crane arm and its cab fell between two buildings under construction.

An investigation is underway into the cause of the collapse.

[fatality]

Lessons

[None Reported]

1252420 May 2000

Source : CNN.COM, U.S. NEWS, MAY 25, 2000, (<http://www.cnn.com>).

Location : Houston, USA

Injured : 0 Dead : 0

Abstract

Approximately 2 million gallons of sewage spilled into a tributary of a nearby creek causing concern for possible contamination of drinking water supplies. The incident occurred when an inspection failed to detect a disabled pump causing sewage to flow out into the tributary. The problem was discovered a day later.

Approximately 65 percent of the nearby city's water supply comes from surface water and approximately 25 percent comes from the nearby creek.

It was reported that the sewage should take about two weeks to reach water supply intake valves in the creek.

The sewage could contain deadly bacteria such as salmonella and shigella and viruses such as hepatitis A, and numerous other harmful microbes.

[design or procedure error]

Lessons

[None Reported]

1097415 May 2000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 15 MAY, 2000, (<http://www.chemsafety.gov>)

Location : Cheshire, UK

Injured : 2 **Dead** : 1

Abstract

One worker was killed and two others injured when scaffolding collapsed whilst they were working inside an incinerator tower.

The workers were carrying out maintenance inside the tower 40 metres up when the platform collapsed beneath them.

[fatality, fall, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, MAY 8, 2000, (<http://www.chemsafety.gov>).

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Location : Tooele, USA

Injured : 0 **Dead :** 0

Abstract

A leak of a harmful nerve-agent occurred due to a feed chute jam on an incinerator. The incinerator was shut down to investigate the source of the leak.

[plant shutdown, mechanical equipment failure, gas / vapour release]

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]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 14 APRIL, 2000, (<http://www.chemsafety.gov>),

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Location : Grand Rapids, USA

Injured : 2 **Dead :** 0

Abstract

Approximately 20,000 gallons of petroleum products including hydraulic oils, starting fluids, automobile carburettor cleaners and racing fuel was spilled during a fire at a warehouse.

55-gallons drums and cases of petroleum products fuelled the fire.

Property damaged was estimated at \$1 million (2000). Two fire fighters were treated for smoke inhalation.

[environmental, warehousing, fire - consequence, injury, damage to equipment]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 13 APRIL, 2000, (<http://www.chemsafety.gov>),

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Location : Egelston Township, USA

Injured : 10 **Dead :** 0

Abstract

An explosion occurred in a wastewater collection system injuring ten people. A large cloud of dust was released after the explosion; it is not known whether any chemicals were released.

Severe damage occurred to equipment.

[gas / vapour release, people, damage to equipment, injury]

Lessons

[None Reported]

1246512 April 2000

Source : CNI NEWS, 14 APRIL, 2000, (<http://www.cnionline.com>).

Location : , IRELAND

Injured : 7 Dead : 0

Abstract

An explosion occurred at a fine chemicals and pharmaceuticals plant. As a result the plant was shut down whilst an investigation was to be carried out into the cause of the explosion.

Seven workers were treated for shock and hearing difficulties.

[plant shutdown, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 12 APRIL, 2000,CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 9 MAY, 2000, (<http://www.chemsafety.gov>),

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Location : Muskegon, USA**Injured :** 8 **Dead :** 0**Abstract**

An explosion occurred at chemical plant injuring eight, three critically. An investigation into the cause of the explosion is being carried out. It is thought that one of the chemicals involved was toluene. Severe damage occurred to the building.

[damage to equipment, injury]

Lessons

[None Reported]

Source : CNI NEWS, 10 APRIL, 2000, (<http://www.cnionline.com>)

Location : Toronto, Ontario, CANADA

Injured : 0 Dead : 0

Abstract

A fire occurred at a coatings and sealant plant.

Half the building was destroyed in the fire.

An investigation into the cause of the fire is underway.

No one was injured in the incident.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

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

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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]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 26 MARCH, 2000, (<http://www.chemsafety.gov>).

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Location : Canton, USA

Injured : 0 **Dead :** 0

Abstract

Approximately 360 gallons of gasoline spilled into an lake when a fuel pipe ruptured. Approximately 20 people were evacuated as a precaution.

[material of construction failure, evacuation]

Lessons

[None Reported]

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

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Location : Hempfield Township, USA

Injured : 3 **Dead :** 0

Abstract

An explosion occurred caused by excavation work. The incident occurred as workers were installing underground cable when they pierced a sewer line and a 12-inch natural gas main.

Forty five minutes later an explosion ripped through two.

[human causes, rupture, fire - consequence, injury]

Lessons

[None Reported]

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

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Location : Sartyera, UZBEKISTAN

Injured : 1 **Dead :** 8

Abstract

An explosion and fire occurred at a storage facility. Eight people were killed and one seriously injured in the blast. It is thought that a natural gas leak caused explosion and fire.

The building was completely destroyed.

[burns, fire - consequence, fatality, damage to equipment, injury]

Lessons

[None Reported]

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

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Location : Kenedy, Texas, USA

Injured : 0 **Dead :** 0

Abstract

An explosion occurred on a pipeline causing severe damage. Valves were shut off to stop the flow of natural gas and a nearby road was closed as precaution. The subsequent fire was extinguished in about an hour.

An investigation into the explosion is underway.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 22 MARCH, 2000, (<http://www.chemsafety.gov>).

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Location : North Powder, Oregon, USA

Injured : 0 **Dead :** 0

Abstract

A rail transportation incident. Approximately 1000 gallons of fuel spilled from one or more tank cars when a freight train derailed. Clean-up operations are underway.

The incident caused damage to about a quarter-mile of track.

[derailment, damage to equipment]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 22 MARCH, 2000, (<http://www.chemsafety.gov>).

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Location : Muncie, USA

Injured : 0 **Dead :** 0

Abstract

A fire and several explosions occurred at a plant causing severe damage.

The fire was made even worse by exploding chemical tanks.

Water from the fire bypassed the plant's wastewater treatment plant and spilled directly into the nearby river.

It is feared that runoff water from the fire may be contaminated.

An investigation into the incident determined that the blaze started in the storage area.

[fire - consequence, damage to equipment, contamination, design or procedure error, unknown chemicals]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 22 MARCH, 2000, (<http://www.chemsafety.gov>).

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Location : Albuquerque, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred in a warehouse at a packaging plant. Concern has been raised by nearby residents that half a million gallon of runoff water from the fire may be contaminated.

An investigation into the cause of the fire is being carried out.

[fire - consequence, contamination, warehousing]

Lessons

[None Reported]

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

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Location : Grand Prairie, CANADA

Injured : 0 **Dead :** 0

Abstract

An explosion occurred during welding operations on a tanker truck. The incident occurred when sparks ignited leftover fumes after the tanker had been emptied of its load of flammable oil well service water.

The explosion blew a hole 8 metres in diameter through the sheet metal roof and dented three overhead garage doors. Fortunately no one was injured in the incident.

Damage was estimated at \$350,000 (2000) to the building and \$70,000 (2000) to the truck.

[road transport, damage to equipment]

Lessons

[None Reported]

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

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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]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 13 MARCH, 2000, (<http://www.chemsafety.gov>).

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Location : Chonburi, THAILAND

Injured : 1 **Dead :** 0

Abstract

A fire occurred at a footwear factory. The factory was totally destroyed in the fire which was fuelled by combustibile adhesives and rubber stored inside.

An investigation into the incident is being carried out.

[fire - consequence, damage to equipment, storage, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 10 MARCH, 2000, (<http://www.chemsafety.gov>).

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Location : Tampico, MEXICO

Injured : 31 **Dead :** 0

Abstract

A propane tank exploded injuring 31 people and causing damage to equipment. The injured suffered burns.

The cause of the explosion was due to an electrical short near to the tank, which was leaking at the time.

[explosion, short circuit, fire - consequence, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 9 MARCH, 2000. (<http://www.chemsafety.gov>).

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Location : Shanghai, CHINA

Injured : 8 **Dead :** 7

Abstract

An explosion and fire occurred at a food company killing seven and injuring eight people. Nearby residential areas were damaged by the blast.

The cause of the incident is under investigation.

[fire - consequence, fatality, damage to equipment, processing, injury]

Lessons

[None Reported]

1225308 March 2000

Source : CNI NEWS, 8 MARCH, 2000, (<http://www.cnionline.com>).

Location : Rayong, SINGAPORE

Injured : 200+ Dead : 1

Abstract

A 50,000-tonne/year polycarbonate plant was shutdown after a leak of carbonyl chloride gas or phosgene occurred.

One person was killed and approximately 200 workers and residents needed hospital treatment for breathing problems, one worker was critical.

The incident occurred after the leak was detected issuing from a fractured pipe, the gas then travelled through the plant's ventilator system and was released into the atmosphere surrounding the building and nearby residential areas.

An investigation is being carried out into the cause of the incident.

[plant shutdown, processing, fatality, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 9 MARCH, 2000, (<http://www.chemsafety.gov>).

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Location : Lake Alfred, USA**Injured** : 0 **Dead** : 0**Abstract**

A fire occurred at a fertilizer plant. The incident occurred whilst plant workers were welding a metal bin, which was still containing chemicals. The fire occurred inside a 12-foot by 30-foot hopper containing a mixture of sludge, or sewage, and ammonium nitrate used to make the fertilizer. Fifteen workers were evacuated and fire fighters eventually brought the fire under control. Sand was placed around a nearby storm drain to contain the chemicals.

The plant was closed down for repairs and clean up.

No injuries were reported.

[fire - consequence, evacuation, plant shutdown, design or procedure error]

Lessons

[None Reported]

Source : CHEMICAL HAZARDS IN INDUSTRY, JUNE 2000.; CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, MARCH 6, APRIL 26, 2000, (<http://www.chemsafety.gov>).

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Location : Radford, USA

Injured : 7 **Dead :** 3

Abstract

An explosion occurred at an auto parts factory killing three people and injuring seven.

Damage is estimated at \$30-50 million (2000).

Approximately one hundred workers were in the plant at the time of the explosion.

The cause of the explosion is under investigation but it is thought that a build up of natural gas may have been the cause.

[fire - consequence, damage to equipment, fatality, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 5 APRIL, 2000, (<http://www.chemsafety.gov>),

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Location : Newport, USA

Injured : 0 **Dead :** 0

Abstract

A chemical plant was ordered to shut down as a precaution due to the potential of an explosion occurring and the possibility of contamination of a well. The company was ordered to shut down after inspectors found corroded and leaking containers and decaying chemicals.

[plant shutdown, human causes, unknown chemicals]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, MARCH 6, 2000,
(<http://www.chemsafety.gov>).

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Location : Morral, USA

Injured : 0 **Dead :** 0

Abstract

A chemical spill forced the evacuation of an entire town when two small tanks containing fertiliser collapsed. A dike surrounding the facility successfully contained the spill.

The tank contained non-toxic farm fertiliser, but there was cause for concern that the fertiliser could mix with other chemicals creating a toxic substance.
[mechanical equipment failure, storage]

Lessons

[None Reported]

12768 March 2000

Source : CHEMICAL HAZARDS IN INDUSTRY, JUNE 2000.; OCCUPATIONAL HAZARDS, APR 2000, 62(4), 24.

Location : Westchester, USA

Injured : 0 Dead : 0

Abstract

A small crack was discovered in a tube on a nuclear plant that caused a small amount of radioactive steam to enter the atmosphere. Radioactive water leaked from the cracked reactor and contaminated clean water used to drive turbines.

The crack was discovered using a remote-controlled device with attached video camera.

The plant will remain out of service for several weeks.

[gas / vapour release, contamination, reactors and reaction equipment]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, FEBRUARY 24, 2000. (<http://www.chemsafety.gov>).

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Location : Wichita, USA

Injured : 0 **Dead :** 0

Abstract

Approximately 100 students were evacuated from a university when a fire occurred in it's engineering department.

The incident occurred after an experiment had been carried out involving hydraulic fluid. Apparently the hydraulic fluid seeped into a burner and smouldered until it finally caught fire. Damage to equipment is estimated at \$50,000 to \$75,000 (2000).

[evacuation, fire - consequence, leak, heating equipment]

Lessons

[None Reported]

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

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Location : Savannah, USA

Injured : 0 **Dead :** 0

Abstract

A road transportation incident. A truck carrying plastic containers containing 41,000 pounds of ferric chloride buckled under the weight. Three containers ruptured as a result and it is thought that they started to leak from the top. A hazardous response team used granulated absorbent material to soak up diesel fuel that spilled and a baby pool was used to catch diesel fuel still leaking.

Lessons

[None Reported]

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

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Location : British Columbia, CANADA

Injured : 0 **Dead :** 0

Abstract

A marine transportation and road transportation incident. A semi-trailer tanker aboard a cargo ferry ruptured a tank and spilled its contents of gasoline onto the deck and into the sea.

The dispersment of the gasoline was a priority as concentrated vapours become explosive.

Lessons

[None Reported]

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

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Location : , USA

Injured : 0 **Dead :** 0

Abstract

A road transportation incident. The driver of a truck discovered a leak of organic peroxide. As the driver went to open the doors to investigate he became contaminated with organic peroxide.

The driver was decontaminated in a special shower. Fortunately he was not injured.

[contamination, people]

Lessons

[None Reported]

1220515 February 2000

Source : CNN.COM, U.S. NEWS, FEBRUARY 16, 2000, (<http://www.cnn.com>).

Location : New York, USA

Injured : 0 Dead : 0

Abstract

A radioactive leak occurred at a power plant. The incident occurred when a small leak was detected in a steam generator at the plant's containment building, a sealed concrete building that holds the reactor at the nuclear power plant. Approximately 1 cubic foot of gas escaped.

The leak was immediately isolated and the plant shut down.

An investigation into the incident found that the leak occurred in a tube used to carry hot, radioactive, high-pressure water to a pool of cool, non-radioactive water. Steam produced when the hot water hits the cool water, turns a turbine and generates electricity.

The plant will remain closed for maintenance.

[gas / vapour release, plant shutdown, processing]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 13 MARCH, 2000, (<http://www.chemsafety.gov>).

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Location : Lexington, USA

Injured : 0 **Dead :** 0

Abstract

A chemical spill occurred at a sewer plant causing the plant to be shutdown.

The waste from the spill contains industrial solvents, which overpowered the plant and leaked into nearby waterways, killing hundreds of fish and made drinking water unsafe.

[plant shutdown, environmental, ecological damage]

Lessons

[None Reported]

Source : CNN.COM, U.S. NEWS, FEBRUARY 10, 2000. (<http://www.cnn.com>).

Location : Philadelphia, USA

Injured : 13+ Dead : 0

Abstract

Tonnes of freshly poured concrete with reinforcing rods and forms collapsed at a construction site, injuring at least 13 workers

It is thought that the injured fell approximately 30 feet and were covered in concrete, scaffolding and a steel reinforcing bar.

Two of the injured were reported to be in a serious condition.

[fall, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, MARCH 7, 2000. (<http://www.chemsafety.gov>).

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Location : Hanau-Wolfgang, GERMANY

Injured : 4 **Dead :** 0

Abstract

A glass vessel exploded whilst under vacuum, releasing 100 litres of propionic acid and injuring four workers. Damage was estimated at DM10,000 (US \$5,100) (2000).

One worker was taken to hospital suffering from acid burns.

[explosion, normal operations, container, damage to equipment, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, FEBRUARY 8, 2000. (<http://www.chemsafety.gov>).

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Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

A road transportation incident. A tanker truck carrying furfural overturned causing the substance to spill into a drainage hole that empties into a nearby ditch, which drains into a ship channel. Approximately 9,000-gallons was spilt.

People were advised that fish in and around the area might be contaminated.

Clean-up efforts are underway.

Furfural is a colourless, oil, all-natural ethanol derivative used mainly in the manufacture of plastics. The substance is highly flammable, explosive and toxic.

Furfural is lethal if ingested or inhaled. If a person comes in contact with the chemical it can also irritate the skin, eyes and throat.

[contamination]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, FEBRUARY 8, 2000. (<http://www.chemsafety.gov>).

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Location : Baia Mare, ROMANIA

Injured : 0 **Dead :** 0

Abstract

A spill of cyanide occurred when the protective wall of a dam at a gold smelter was damaged by heavy snowfalls.

Cyanide levels were recorded at 700 times the normal in nearby river water after the spill. The smelter was closed down pending an investigation.

The spill forced towns along the river to close their water intake systems and has killed fish, birds and other wildlife.

[solids processing, heating equipment, plant shutdown, environmental, ecological damage, weather effects, cyanide product]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, FEBRUARY 1, 2000. (<http://www.chemsafety.gov>).

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Location : , USA

Injured : 1 **Dead :** 0

Abstract

A fire and explosion occurred at a refinery on two separate days. The first to occur was an explosion, which slightly injured a worker and badly damaged a platformer.

The fire occurred about a week later and involved a vacuum that feeds into the plant's fluid catalytic cracking unit. Approximately 130 gallons of crude oil had caught fire.

The fire was put out within minutes using hand-held fire extinguishers.

It is thought that a fractured steam line caused the fire.

[fire - consequence, damage to equipment, injury]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JANUARY 27, 2000, (<http://www.chemsafety.gov>).

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Location : Winchester, USA**Injured :** 0 **Dead :** 0**Abstract**

Approximately 11,500 and 21,000 barrels of oil spilt from a ruptured pipeline into a creek. Nearby residents were evacuated. A precautionary boom was placed by the mouth of the creek to contain any oil from spilling into the river. It was not immediately known what caused the rupture.

[spill, evacuation]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JANUARY 21, 2000, MARCH 20 2000,
(<http://www.chemsafety.gov>).

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Location : Los Alamos, USA

Injured : 0 **Dead :** 0

Abstract

Approximately 500 to 1,000 gallons of waste water thought to be contaminated with high explosives was accidentally released from holding tanks onto 200 square feet of soil surrounding the tanks.

An investigation into the incident found that the water did not contain concentrations of explosives residue.

Analysis of the water found it contained trace amounts of solvents and other chemicals.

[spill, contamination]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JANUARY 12, 2000, (<http://www.chemsafety.gov>).

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Location : , USA**Injured :** 0 **Dead :** 0**Abstract**

An 8-inch gas pipeline ruptured creating a large crater on a highway forcing its closure. The release of gas from the pipeline rupture did not ignite.

Several nearby homes were evacuated, there were no reports of any injuries.

[gas / vapour release, evacuation, near miss]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JANUARY 12, 2000, (<http://www.chemsafety.gov>).

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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]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JANUARY 12, 2000, (<http://www.chemsafety.gov>).

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Location : , USA

Injured : 0 **Dead :** 0

Abstract

An explosion and fire occurred on a building under construction. The incident occurred when a propane tank rusted through and leaked propane into a heating unit used to dry drywall. Nearby, approximately 20 propane tanks were in danger of exploding. Damage was estimated at \$35,000 to \$40,000 (2000).

[fire - consequence, damage to equipment, spill, corrosion, heating equipment]

Lessons

[None Reported]

Source : HAZARDOUS CARBO BULLETIN, JUNE 2000.

Location : Ohio, USA

Injured : 0 Dead : 0

Abstract

A catastrophic failure of a storage tank occurred causing the release of approximately one million gallons of fertiliser into the environment. The most likely cause of the failure is thought to be due to weld failure. Four adjacent tanks were damaged by the outflow of the product. An estimated 3,300m³ of product was spilt into a nearby river; the remainder was contained in bunds.
[tank failure, spill, pollution, damage to equipment, storage tanks]

Lessons

[None Reported]

121662000

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JANUARY 25, 2000, (<http://www.chemsafety.gov>).

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Location : Masury, USA

Injured : 1 **Dead :** 0

Abstract

Six propane tanks exploded at an industrial park causing approximately \$500,000 (2000) in damage. The cause was due to a leak of propane from a space heater, which ignited and caused the 50-pound cylindrical tanks to explode.

At the time of the incident workers were using the heaters for warmth as they carried out sand blasting work on a large tank inside a gas turbine.

A worker suffered second degrees burns and third degree burns in the incident.

An investigation into the explosions is being carried out.

[damage to equipment, explosion, maintenance, injury]

Lessons

[None Reported]

132242000

Source : CHEMICAL HAZARDS IN INDUSTRY, NOVEMBER 2000.

Location : Ontario, CANADA

Injured : 5 **Dead** : 0

Abstract

An explosion occurred in a paint area of an automotive assembly plant. The explosion occurred after a solvent line rupture. Five people were injured in the incident.

[injury]

Lessons

[None Reported]

Source : CHEMICAL HAZARDS IN INDUSTRY, MARCH 2000.; PLAST. NEWS, 10 DEC 1999, (<http://www.plastics-news.com>).

Location : , USA

Injured : 0 Dead : 0

Abstract

A fire occurred at a plastics plant. Damage caused by the fire is estimated to be more than £2 M (1999).

Fortunately no personnel were in the plant at the time of the fire and no injuries were reported.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

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

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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]

1236902 December 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, MARCH 2000,; CHEM. WEEK, 15 DEC 1999, 161(48), 17.

Location : Deer Park, Texas, USA

Injured : 2 **Dead** : 0

Abstract

An explosion and fire occurred at a chemical plant. The fire caused major damage to a multipurpose metal alkyl unit. Two workers were injured in the blast.
[fire - consequence, damage to equipment, injury]

Lessons

[None Reported]

Source : CNN.COM, U.S. NEWS, NOVEMBER 23, 1999,
(<http://www.cnn.com>).

Location : , USA

Injured : 5 Dead : 1

Abstract

Workers on a construction site were pouring concrete when part of the building they were working on collapsed, plunging them three stories and burying them in debris and wet concrete.

One worker was killed and five injured.

[fatality, fall, safety procedures inadequate, injury]

Lessons

[None Reported]

Source : CNN.COM, U.S. NEWS, NOVEMBER 6, 1999, (<http://www.cnn.com>).

Location : Missouri, USA

Injured : 1 Dead : 1

Abstract

An explosion occurred in a fireworks plant, killing one person and seriously burning another. The workers were working with black powder used in fireworks when the explosion occurred. The blast blew the roof off the building, fortunately the thick concrete walls kept the explosion from damaging other parts of the building.

The cause of the explosion is under investigation.

[fatality, burns, damage to equipment, processing, black powder (gunpowder)]

Lessons

[None Reported]

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]

Source : CNN.COM, U.S. NEWS, SEPTEMBER 25, 1999, (<http://www.cnn.com>).

Location : , GULF OF MEXICO

Injured : 11 Dead : -

Abstract

An offshore incident. A 122 ft drilling rig collapsed and capsized leaving 11 crew to be rescued and one missing.

The incident happened when one of four legs of the jack-up rig gave way in approximately 150-180 ft of water.

[exploration, capsize of platform, mechanical equipment failure]

Lessons

Jack-up rigs are platforms which are used for oil and for other subsurface exploration. They can be floated into place and jacked up on retractable legs to proper height.

Source : CNN.COM, U.S. NEWS, SEPTEMBER 24, 1999, (<http://www.cnn.com>).

Location : , USA

Injured : 4+ Dead : 2

Abstract

The roof of a coal mine collapsed 700 ft underground, killing two miners and injuring several others. At least three miners were taken to hospital, including one other who suffered severe shoulder injuries.

[fatality, injury, mining]

Lessons

[None Reported]

Source : CNN.COM, U.S. NEWS, SEPTEMBER 21, 1999, (<http://www.cnn.com>).

Location : New Jersey, North Carolina, USA

Injured : - Dead : -

Abstract

People were told to boil their tap water after fears of contamination caused by Hurricane Floyd.

Drinking water was found to have been contaminated by overflow from sewage plants and animal waste lagoons.

Floodwaters were contaminated by fuel, farm chemicals and manure. Flooding also swept at least 1,000 containers of explosive and toxic materials into waterways. Officials warned people not to come into contact with any drums, cylinders or other unfamiliar objects. The biggest danger comes from flammable materials like gasoline, cleaning solvents and propane gas.

More than a million gallons of waste water thought to contain chromium, spilled at a chemical plant during the hurricane.

[toxic chemical]

Lessons

Water contaminated by sewage and animal waste could cause a host of gastrointestinal illnesses.

Source : CNN.COM, U.S. NEWS, SEPTEMBER 21, 1999, (<http://www.cnn.com>).

Location : , AFRICA

Injured : 0 Dead : 0

Abstract

A bomb attack carried out on a pipeline stemmed the flow of crude oil. The pipeline had just begun exporting crude oil. Slight damage occurred.
[damage to equipment]

Lessons

[None Reported]

Source : CNN.COM, U.S. NEWS, SEPTEMBER 20, 1999, (<http://www.cnn.com>).

Location : Maryland, USA

Injured : 37 Dead : 0

Abstract

A rail transportation incident. A passenger train collided with a freight train in a rail yard, injuring 37 people. The collision damage the locomotive and the rear of the freight car. All cars remained upright.

[damage to equipment, injury]

Lessons

[None Reported]

Source : CNN.COM, U.S. NEWS, SEPTEMBER 20, 1999, (<http://www.cnn.com>).

Location : , GULF OF MEXICO

Injured : 0 Dead : 0

Abstract

A marine transportation incident. A fire occurred onboard a cruise ship which was carrying 1,700 passengers.

The fire started in the engine room, which was quickly put out, but had damaged the engines. The star-board motor was temporarily restarted, but failed again, stranding the ship 100 miles off the coast.

[fire - consequence, damage to equipment, passenger ship]

Lessons

[None Reported]

Source : BBC NEWS, SEPTEMBER 19, 1999, (<http://www.bbc.co.uk>).

Location : , THAILAND

Injured : 120+ Dead : 23+

Abstract

An explosion occurred at a fruit processing factory, killing 23 and injuring 120 people. The explosion was so powerful that it completely destroyed the factory and flattened 30 nearby buildings. It is thought that sacks of potassium nitrate were involved with the cause of the explosion. (Potassium nitrate, a chemical used both as a fertiliser, food preservative and an ingredient in gun powder).

A report stated that fire fighters were called to prevent a fire from spreading to a 5000 litre fuel tank in the factory grounds.

The factory was used for processing and drying longans, a tropical fruit.

[fire - consequence, container, fatality, damage to equipment, injury]

Lessons

[None Reported]

Source : CHEMICAL HAZARDS IN INDUSRTY, FEBRUARY 2000,; HAZARDOUS CARGO BULLETIN, NOVEMBER 1999.

Location : Humboldt Bay, USA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. Approximately 9000 litres of oil spilled into a bay when a fuel tank onboard a dredger ruptured. The spillage occurred during heavy seas, which apparently caused part of the dredging equipment to smash into the hull of the vessel.

Lessons

[None Reported]

11872September 1999

Source : BBC NEWS, SEPTEMBER 15, 1999, (<http://www.bbc.co.uk>).

Location : , UK

Injured : 0 Dead : 0

Abstract

A toxic chemical used as a sealant for glass jars of baby food was found to have been seeping into the product. A test carried out found that 66 of 137 samples of baby food from glass bottles contained the chemical, epoxidised soya bean oil, ESBO.

ESBO is used on jars to prevent contamination from bacteria or anything else by creating an airtight seal, and also helps make signs of tampering more obvious. [contamination, container]

Lessons

ESBO is only dangerous in large quantities.

1175024 August 1999

Source : YAHOO NEWS UK & IRELAND, SEPTEMBER 3, 1999, (<http://www.yahoo.co.uk>).

Location : , ENGLISH CHANNEL

Injured : 20+ Dead : 0

Abstract

A marine transportation incident. A cargo vessel collided with a cruise liner with more than 2,000 people on board.

Fortunately, the cruise liner was able to reach a nearby port safely despite severe damage to its bow.

The 52,000 tonne container ship, caught fire after the collision. More than 40 of the ships 3,092 containers held hazardous materials two of which carrying cyanide, these were stowed in the centre of the vessel and there was no danger of them being lost overboard. Some of the containers fell into the sea during the impact.

Coast guards reported no sign of trouble before the collision and that no radio message had been taken from either vessel.

[container ship, passenger ship, collision, fire - consequence, near miss, spill, damage to equipment, cyanide product]

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]

1288927 July 1999

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A relief valve on a HF alkylation unit acid settler failed to operate under overpressure during an emergency shutdown of all process units following a power failure.

A subsequent release of hazardous materials occurred.

[valve failure, overpressurisation, gas / vapour release, damage to equipment, power supply failure, processing, chemicals unknown]

Lessons

[None Reported]

1194014 July 1999

Source : CNN.COM, U.S. NEWS, 14 JULY, 1999,
(<http://www.cnn.com>).

Location : Milwaukee, USA

Injured : 5 **Dead** : 3

Abstract

A tower crane collapsed while lifting a roof section into place on a building site adjacent to a baseball stadium. The roof section was one of seven sections with a reported total weight of 12,000 tonnes. The wind was reported as gusting to 30 mph at the time of the incident.

The crane collapsed onto the building site and the stadium. Three workers were reported killed and five were injured including the crane operator.

[construction, fatality, injury]

Lessons

[None Reported]

1149014 July 1999

Source : CHEMICAL WEEK, JULY 28, 1999.

Location : , GERMANY

Injured : 0 **Dead :** 0

Abstract

An explosion occurred at a fine chemicals plant causing damages exceeding DM100,000 (\$52,000) (1999). Three workers inside escaped unhurt and no toxic substances were released. Hydrogen peroxide in the plant's water treatment unit is thought to have caused the blast. The plant was shut down.
[contamination, plant shutdown]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, SEPTEMBER 1999.

Location : , SINGAPORE

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. A bulk carrier sank after colliding with a tanker in ballast. Damage occurred to the tanker. Bunkers leaked potash fertiliser from the bulk carrier. None toxic.

[sinking, collision, damage to equipment, spill]

Lessons

[None Reported]

1188223 June 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, SEPTEMBER 1999,; CHEMICAL ENGINEERING, MAY 2000, (<http://www.che.com>).

Location : Pasadena, USA

Injured : 4 Dead : 2

Abstract

A fire halted operations at a chemical plant killing two workers and injuring four others. Damage occurred to the styrene-butadiene copolymer plant. The company was fined \$190,000 (2000).

[fire/explosion, plant shutdown, damage to equipment, fatality, injury]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, SEPTEMBER 1999.

Location : , NIGERIA

Injured : 0 **Dead :** 15

Abstract

An explosion occurred on an oil pipeline killing 15 people. Approximately 100 m3 unspecified fuel was lost.
[fuel, fatality, product loss]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, SEPTEMBER 1999.

Location : Bashkortostan, RUSSIA

Injured : 0 **Dead** : 0

Abstract

A rupture occurred on a main oil line. More than 400 tonnes of oil spilled into a near-by river. A response team was brought in to deal with the spill.
[material transfer, pipeline, crude oil]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JUNE 27, 2000, (<http://www.chemsafety.gov>).

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Location : Bellingham, USA

Injured : 0 **Dead :** 3

Abstract

Approximately 277,000 gallons of fuel spilled from a ruptured pipeline killing three people. Nearby residents were evacuated and other parts of the area were asked to conserve water after a pump station was damaged in the fire and explosion.

The pipeline was later tested. During the first test the pipeline ruptured and spilled 10,000 gallons of water.

Further testing was carried out and all defects were found and repaired.

It is thought that the company will apparently be fined an estimated \$3.05 million (2000), the largest fine ever sought against a pipeline operator.

[fire - consequence, evacuation, fatality, material of construction failure]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, SEPTEMBER 1999.

Location : , FINLAND

Injured : 0 Dead : 1

Abstract

An explosion and fire occurred during maintenance shutdown at a chemical plant killing a worker and destroying a reactor.
[fire - consequence, damage to equipment, reactors and reaction equipment, sodium borohydride, fatality]

Lessons

[None Reported]

1210308 June 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, DECEMBER 1999,; ENDS REP., AUG 1999, 1999(295), 7-8.

Location : , UK

Injured : 0 Dead : 0

Abstract

A public house next to a chemical plant suffered contamination of ground water with xylene. It is thought that the most likely pollution source was the chemical plants' underground xylene storage tanks.

An enforcement order was served on the company on 9 June 1999, to empty the tanks and have them tested for leaks.

The public house had to close a number of times due to the risk of explosions.

An investigation into the incident revealed that xylene may have leaked from the pipes entering the tanks at ground level. The ground water flow under the chemical plant is strongly effected by tidal flow in the river on its boundary.

Lessons

[None Reported]

11098June 1999

Source : BBC NEWS, 17 JUNE, 1999,
(<http://www.bbc.co.uk>).

Location : , BELGIUM

Injured : - **Dead :** 0

Abstract

More than 100 people complained of headaches, dizziness and stomach upsets after drinking canned soft drinks. Investigations into the incident found that the factory had used the wrong type of carbon dioxide gas that gives the drink its fizz, making the drink taste bad, also a fungicide had caused some contamination.

[bottling plant, people, operation inadequate]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, SEPTEMBER 1999.

Location : , NETHERLANDS

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. A lighter carrying 3,150 tonnes of crude oil ran aground. The vessel was re-floated and was found to have sustained severe damage to the bottom plates, no spillage occurred.

[ship ran aground, damage to equipment]

Lessons

[None Reported]

11247 June 1999

Source : BBC NEWS, 28 JUNE, 1999,
(<http://www.bbc.co.uk>).

Location : , NIGERIA

Injured : 0 **Dead :** 15

Abstract

Fifteen people were burned to death by a blazing fuel from a ruptured oil pipeline. The fire broke out after the pipeline was deliberately punctured to enable people to drain off fuel.

More than one hundred thousand litres of oil spilled out.

[fatality, burns, deliberate acts]

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]

1147713 May 1999

Source : CHEMICAL NEWS INTERACTIVE, 14 MAY, 1999.

Location : , SOUTHWESTERN CHINA

Injured : 6+ **Dead :** 0

Abstract

An explosion and fire occurred at a vinyl chloride monomer (VCM) plant injuring several workers, six seriously.

The explosion was so great that it broke glass in surrounding homes.

[fire - consequence, damage to equipment, injury]

Lessons

[None Reported]

Source : CHEMICAL HAZARDS IN INDUSTRY, JULY 1999.

Location : , USA

Injured : 0 **Dead :** 0

Abstract

An explosion occurred at a training centre for automotive sprayers causing total destruction to the building and resulted in several millions of guilders (1999). Fortunately there were no injuries due to no one being in the building at the time of the incident. There was no release of any hazardous substances. The cause of the explosion is not known.
[damage to equipment]

Lessons

[None Reported]

1208504 May 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, JULY 1999.

Location : Guadalajara, MEXICO

Injured : 0 **Dead** : 0

Abstract

A fire occurred on a production facility for polystyrene cups and containers. The whole building was destroyed by the fire. Prior to the fire, 300,000 boxes containing 1000 polystyrene cups were being produced each month.

[fire - consequence, processing, damage to equipment]

Lessons

[None Reported]

11876May 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, SEPTEMBER 1999.

Location : , USA

Injured : 0 Dead : 0

Abstract

A fire occurred at a plant causing damage of £1 million (1999). The incident occurred whilst toluene was being transferred from a 10,000 gallon tank to a 55 gallon drum. A spark caused a flash fire. Approximately 1000 gallons of toluene were spilled.
[fire - consequence, damage to equipment, drums, material transfer]

Lessons

[None Reported]

11246May 1999

Source : BBC NEWS, 16 MAY, 1999, (<http://www.bbc.co.uk>); CNN.COM, U.S. NEWS, 15 MAY, 1999, (<http://www.cnn.com>).

Location : , AFRICA

Injured : 0 Dead : 0

Abstract

A team of specialist fire-fighters were sent to tackle a huge oil tank fire that had been burning for two days which threatened strategic oil stocks near a refinery.

The refinery next to the burning tank was not seriously threatened, however, one of the 13 tanks in the storage complex contained highly inflammable jet fuel which could have triggered a wider inferno, if the fire had reached it. The fire was eventually extinguished after a two day effort by fire-fighters.

The fire destroyed approximately 30,000 cubic metres of petroleum products.

It is not immediately clear what started the blaze, but witnesses said they heard an explosion before the tank, containing super grade gasoline, caught fire.

[storage tanks, fire - consequence, damage to equipment]

Lessons

[None Reported]

11875May 1999

Source : CHEMICAL HAZARDS IN INDUSTRY, SEPTEMBER 1999.

Location : , USA

Injured : 4 **Dead :** 3

Abstract

An explosion occurred at a tetrafluoroethylene plant killing three workers and injuring four others. An investigation is being carried out into the cause of the incident. The plant was subsequently shutdown.

[fatality, plant shutdown, injury]

Lessons

[None Reported]

1250108 April 1999

Source : CNN.COM, U.S. NEWS, APRIL 8, 1999, (<http://www.cnn.com>).

Location : Florida, USA

Injured : 50 Dead : 2

Abstract

A generator exploded inside a coal-fired power plant killing two workers and injuring fifty others. At least three of the injured suffered serious burns.

An investigation into the incident found that a hydrogen gas leak may have caused the explosion.

The explosion occurred as the generator was being tested following routine maintenance.

The plant was shut down whilst investigations took place to make sure that none of the other generators were affected by the blast.

[testing, plant shutdown, fatality, injury]

Lessons

[None Reported]

1299801 April 1999

Source : LOSS PREVENTION BULLETIN, 147, 27,; BBC NEWS, 2 APRIL, 1999, (<http://www.bbc.co.uk>).

Location : , IRELAND

Injured : 0 **Dead** : 0

Abstract

A fire occurred at plant releasing toxic fumes into the atmosphere and forcing the evacuation of approximately 700 nearby residents. The blaze badly damaged the plant. Fortunately no one was injured in the incident.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : CHEMICAL ENGINEERING IN AUSTRALIA, JUNE-AUGUST 1999.

Location : , AUSTRALIA

Injured : 0 **Dead :** 0

Abstract

An acid plant and plant smelter were put out of action when a blower taking the off-gasses from the smelter to the acid plant failed causing severe damage to the blower, the blower building and some equipment surrounding the area.

The failure of the sulphur dioxide blower appears to have been caused by failure of the liners in the mist precipitators during start-up, giving off combustible gases.

[mechanical equipment failure, damage to equipment, gas / vapour release, gas - flammable]

Lessons

[None Reported]

1059028 March 1999

Source : BBC NEWS, MAR 28, 1999,
(<http://www.bbc.co.uk>).

Location : Hampshire, UK

Injured : 0 **Dead** : 0

Abstract

An investigation carried out after thousands of fish were killed, traced an ammonia leak to a nearby factory.

A three mile stretch of the river was found to have been contaminated by ammonia.

Special tankers were used to flush out the contaminated water.

[ecological damage, contamination, pollution]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A fire occurred at the start of a routine gasoline wash operation of lines containing concentrated TEL fluid. The vent valve inside an enclosed ethyl blending building was inadvertently left open by the operator. The enclosed transite building housed an 8,500 gal weigh tank, scales, eductor, eductor pump and manifold. TEL and gasoline were pumped through the vent line and spilled down on to the transite road. Ignition occurred from an unknown source and the resulting fire caused significant damage to about three quarters of the building transite. The fire was brought under control and extinguished in approximately 35 minutes with no loss of TEL fluid from the storage tanks. Repair work commenced soon after the fire and 3 days later, blending was done from the reserve tank.

[fire - consequence, damage to equipment, operational activities, unidentified cause]

Lessons

The source of ignition is unknown but evidence points to it being immediately outside the front (east) door. Possible sources such as the operator's jeep, another passing vehicle, faulty electrical fixtures, an enclosed light over the doorway, the air-purged instrument panel just inside the front door, several motors inside the building and static electricity have all been considered but no particular reason was pointed at.

Through discussion with TEL suppliers, it was concluded that the following revisions should be made:

1. Relocate vent line from a point just above valve No.12 out through the building to a point a safe distance away. The lateral piping would be installed at a sufficient angle to avoid low spots in the line.
 2. Relocate eductor pump to minimise hazards which would occur in the ethyl building from leakage at the pump.
 3. Ventilation in the ethyl building will be improved as much as possible.
 4. Fire protection - an investigation to determine the feasibility of a fail-safe interlocking device to prevent operation of the gasoline wash valve unless vent valves are closed.
-

Source : FIRE PREVENTION 331, APRIL 2000.

Location : Bournemouth, Dorset, UK

Injured : 0 **Dead** : 0

Abstract

A fire occurred at a factory totally destroying the building. An investigation into the incident found that the most likely cause was due to either an electrical fault or was started deliberately.

Estimated loss is thought to be £450,000 (1998).

[fire - consequence, damage to equipment]

Lessons

[None Reported]

1187415 March 1999

Source : CNN.COM, U.S. NEWS, SEPTEMBER 13, 1999, (<http://www.cnn.com>);; CNN.COM, U.S. NEWS, SEPTEMBER 14, 1999, (<http://www.cnn.com>).

Location : Bourbonnias, USA

Injured : 11 Dead : 122

Abstract

A rail transportation and road transportation incident. A collision between a passenger train and a road truck occurred on a railroad crossing, killing 11 passengers and injuring 122. The crash derailed several cars behind the locomotives. Many of the dead were in a sleeping car which was totally destroyed by a diesel fire. It is not yet known the exact cause of the incident.

The crash caused more than £14 million (1999) in damage.

[derailment - consequence, fire - consequence, damage to equipment, fatality, injury]

Lessons

[None Reported]

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]

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.

Source : FIRE PREVENTION 331, APRIL 2000.

Location : Oxfordshire, UK

Injured : 0 Dead : 0

Abstract

A fire occurred at a factory. The fire started in two large waste containers, which then spread to the plastic windows of the main roller shutter door. Hanging plastic strips located behind the door were also ignited causing the fire throughout the contents of the factory.

The factory contained electrical components packed in polystyrene and cylinders of compressed gas containing nitrogen, oxygen, helium, halon or hydrogen. One cylinder started to vent forcing all personnel to evacuate the building. Eventually the venting stopped and crews were able to isolate and begin damping down procedures.

An investigation into the incident found it unlikely that hot or burning materials were placed in the containers accidentally.

It is thought that the most likely cause was due to deliberate ignition. Estimated loss is thought to be £1,176,000 (1999).

[fire - consequence, evacuation, damage to equipment, storage]

Lessons

[None Reported]

10534February 1999

Source : BBC NEWS, FEB 9, 1999,
(<http://www.bbc.co.uk>).

Location : , UK

Injured : 0 **Dead :** 0

Abstract

Ground water contaminated with tritium leak into a stream via a drainage system at an atomic weapons plant.
[spill, contamination]

Lessons

There is no safe level of radioactivity. Tritium as a substance is difficult to control as it is an element of hydrogen and therefore, easily gets into the body and blood system.

1082413 January 1999

Source : BBC NEWS 1999, (<http://www.bbc.co.uk>).

Location : , CHINA

Injured : 0 **Dead :** 22+

Abstract

An explosion occurred at a fireworks factory killing at least twenty two people. The blast caused the collapse of the two storey workshop.
[fatality]

Lessons

[None Reported]

1138109 January 1999

Source : EUROPEAN CHEMICAL NEWS, 18-24 JANUARY, 1999.

Location : , NETHERLAND

Injured : 0 Dead : 0

Abstract

Polypropylene plant shut down after an explosion in the extrusion unit.

[plant shutdown, solids processing equipment]

Lessons

[None Reported]

1082504 January 1999

Source : BBC NEWS 1999, (<http://www.bbc.co.uk>).

Location : , CHINA

Injured : 0 Dead : 39+

Abstract

A steel bridge collapsed killing thirty nine people. Investigations into the collapse found irregularities in both the contracting and the construction. It was found that parts of the bridge were rusty, concrete used in its construction was too weak and there were serious welding problems.

The search for more bodies is still going on, with part of the river tributary being drained to try and reach victims trapped by the debris.

[material of construction failure, human causes, fatality]

Lessons

[None Reported]

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.

120801999

Source : CHEMICAL HAZARDS IN INDUSRY, OCTOBER 1999.; LOSS PREVENTION BULLETIN, 147, PAGE 18-19.

Location : ,

Injured : 6 Dead : 0

Abstract

A hyper ethylene compressor on a low-density polyethylene manufacturing unit, suddenly stopped with bang. This was due to the failure of the second stage front feed crosshead pin through-bolt which resulted in the fracture of both plungers of the front feed cylinders. The leaking ethylene was automatically diverted to the reactor enclosure though emergency vent piping. Damage occurred to the compressor. It is thought that the failure was due to problems resulting from replacement of the pin a year earlier.
[mechanical equipment failure, damage to equipment, normal operations]

Lessons

Improvements in inspection and repair of the bolts were recommended.

128601999

Source : QUARTERLY SAFETY SUMMARY, 1976, VOL.47, NO's. 185, 186,; CHEMICAL HAZARDS IN INDUSRY, OCTOBER 1999,; LOSS PREVENTION BULLETIN 147, PAGE 17.

Location : ,

Injured : 0 **Dead :** 0

Abstract

A monomer charge pump casing ruptured at the joint whilst out of service and unattended on a vinyl chloride monomer (VCM) tank farm. A release of liquid and vapour occurred and explosively ignited.

Many of the possible causes include, accidental starting of the pump when liquid filled and valved off, or the decomposition of instable compounds, or internal vapour/air ignition, the probable one was considered to be a combination of overpressurisation due to liquid VCM expansion in a completely full and leak tight system coupled with a weakened case joint due to over-tightened replacement mild steel studs in weakened holes where high tensile stud should have been fitted.

[gas / vapour release, explosion, fire - consequence]

Lessons

The following recommendations were made:

1. Regular maintenance and corrosion inspections to be carried out.
 2. Improvements to operational practice, plant management and Hazop were suggested.
-

128751999

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Three nozzles on top of a reactor suffered cracks in the welds during decommissioning of a high-pressure lube oil hydrogenation unit when it inadvertently discharged liquid nitrogen into three reactors. Excessive shrinking occurred, caused by thermal shock.

Damage that occurred to equipment is estimated to be approximately US\$55,000 (1999).

[operation inadequate, reactors and reaction equipment, damage to equipment]

Lessons

[None Reported]

124341999

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An explosion occurred in an acid relief neutraliser vessel of an HF alkylation plant. The explosion blew off the top section of the vessel rupturing process and flare lines, the section landed in a pipe bridge some 40 metres away causing damaged to process and utility lines. Fire broke out at both locations.

Amongst the severed lines was the reboiler return line of the main fractionator, causing this column to depressurise into the fire. The failure of utility lines in the pipe track led to the loss of fuel gas, instrument air pressure and cooling water, which in turn led to a cascaded shutdown of the refinery.

No major injuries occurred in the explosion or in the fire fighting effort.

The situation was brought under control in 4 hours and all fires were extinguished in 6 hours. Approximately 5 tonnes of the HF (hydrofluoric acid) inventory was lost to the environment. This loss is thought to have come from the severed reboiler return line because the main fractionator lost pressure and reverse flow occurred in parts of the plant. The firewater absorbed the spilled HF.

Sodium bicarbonate was added to the out-fall canal and helped to control the pH of the effluent water. No damage to the environment has been recorded.

The damage to the equipment by the explosion and subsequent fires was considerable. The refinery was shutdown for 2 weeks and it took 3 months to repair and re-start the alkylation plant.

[damage to equipment, fire - consequence, plant shutdown, processing, mechanical equipment failure]

Lessons

[None Reported]

Source : ICHEME

Location : , MALAYSIA

Injured : 12 Dead : 0

Abstract

An explosion occurred on an air separation unit on a middle distillate synthesis plant.

The plant is designed to convert natural gas to naphtha, kerosene, gas oil, paraffins and wax. The synthesis gas for the gasification process is produced by partial oxidation of methane using pure oxygen.

Pure oxygen at 2,500 tonnes/day is produced by an air separation plant. It is understood that the explosion/detonation took place inside the N₂/O₂ separation column due to contamination (CO, NO or hydrocarbons).

Although the incident is still under investigation, the source of the contamination may have been due to the heavy haze in the region from forest fires. The air feed to the separation unit is water-washed and passes through a molecular sieve. Preliminary calculations, however, show that concentrations of contaminants as low as ppm in the inlet air feed could build up to kilogram quantities in the bottom of the fractionator.

Windows were broken 1.5 km away. Missiles landed in an adjacent liquefied natural gas (LNG) plant (500m away). One piece of metal (1.5 tonne) landed 800 m away.

Heavy damage occurred to the plant.

Fortunately, there were no fatalities and fortunately, the control room was designed for blast resistance.

Twelve injuries were reported on adjacent properties.

[separation equipment, damage to equipment, injury]

Lessons

The report stated the following recommendations:

Sites operating air separation units are to be made aware that contaminants can build up in these units to cause substantial explosions.

1301911 December 1998

Source : NATIONAL TRANSPORTATION SAFETY BOARD ABSTRACT OF FINAL REPORT, PIPELINE ACCIDENT REPORT, NTSB/PAR-00/01, NATURAL GAS PIPELINE RUPTURE AND SUBSEQUENT EXPLOSION, ST. CLOUD MINNESOTA, DECEMBER 11, 1998.

Location : St. Cloud, Minesota, USA

Injured : 13 **Dead** : 4

Abstract

An explosion occurred on a 1-inch diameter high-pressure plastic gas pipeline. The incident occurred when an installation crew struck and ruptured the pipeline causing a gas leak. Approximately forty minutes later an explosion occurred. Four people were killed and thirteen people injured in the incident. Damage to buildings and equipment is estimated at \$399,000 (1998).

An investigation into the incident revealed the following:

1. The marked location of the ruptured gas line was accurate and therefore was not a factor in the incident.
2. Installation procedures were inadequate in that they did not address steps to take under unusual circumstances such as striking a significant underground obstacle, to ensure that buried utilities were protected during the entire installation process including the underground portion.
3. Has someone immediately called for emergency assistance after the rupture, they may have had time to fully assess the risk and to take actions that could have helped either to prevent the explosion or to avoid the resulting loss of life.
4. The risk to people and property was not fully addressed by emergency personnel.
5. Had the gas line in this incident been equipped with an excess flow valve, the valve may have closed after the pipeline ruptured and the explosion may not have occurred.

[excavation damage, human causes, fatality, injury]

Lessons

[None Reported]

Source : 1998 CABLE NEWS NETWORK.

Location : , INDIA

Injured : 260 Dead : 192+

Abstract

A rail transportation incident. A passenger train derailed when it collided with a mail train minutes after it had jumped the tracks.

A total of 1,700 passengers were aboard both trains. In all 16 cars were damaged in the incident.

[derailment - consequence, collision, damage to equipment]

Lessons

[None Reported]

1044414 November 1998

Source : BBC ONLINE NETWORK, 1998, (<http://www.bbc.co.uk>).

Location : , HONG KONG

Injured : 0 Dead : 0

Abstract

A marine transportation incident. Two oil tankers collided causing a major oil slick.

There are fears the spillage will pose a serious threat to marine life in the area, including the endangered white dolphin.

The diesel oil poured into an area near the mouth of a river. Both the tankers were carrying thousands of tonnes of oil. Two tanks on one vessel were badly damaged, each with a capacity of 1,000 tonnes of oil.

The oil formed a slick reported to be about 10km long and five metres to 50 metres wide.

[collision, spill, environmental, damage to equipment]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A storage sphere partially collapsed due to vacuum. The incident occurred during blending operations. Blending was immediately stopped and the sphere blocked in, the area was evacuated and nitrogen was introduced into the sphere to relieve the vacuum. The material in the sphere was transferred to a crude tank.

An investigation into the cause revealed that introduction and removal of flow natural gasoline to and from the sphere, which was not designed for a vacuum. [evacuation, design or procedure error]

Lessons

The following lessons were learned:

1. Vessels designed for a low pressure may not withstand a vacuum.
 2. Vacuum may be created by a number of factors including a high pumping out rate, lower ambient temperature, lower vapour pressure of the liquid in the vessel.
-

Source : BBC ONLINE NETWORK 1998.

Location : , OFFSHORE CHINA

Injured : 0 Dead : 0

Abstract

A marine transportation incident. Two oil tankers collided causing a major oil slick.

There are fears the spillage will pose a serious threat to marine life in the area, including the endangered white dolphin.

The diesel oil poured into an area near the mouth of a river. Both the tankers were carrying thousands of tonnes of oil. Two tanks on one vessel were badly damaged, each with a capacity of 1,000 tonnes of oil.

The oil formed a slick reported to be about 10km long and five metres to 50 metres wide.

[collision, damage to equipment, pollution]

Lessons

[None Reported]

10446 November 1998

Source : CNN.COM, U.S. NEWS, 1998, (<http://www.cnn.com>).

Location : , INDIA

Injured : 260 Dead : 192+

Abstract

A rail transportation incident. A passenger train derailed when it collided with a mail train minutes after it had jumped the tracks.

A total of 1,700 passengers were aboard both trains. In all 16 cars were damaged in the incident.

[derailment - consequence, collision, fatality, damage to equipment]

Lessons

[None Reported]

Source : CHEMICAL HAZARDS IN INDUSTRY, JUNE 2000.; PPCJ, POLYMERS, PAINT, COLOUR JOURNAL, OCT 1998, 188(4409), 5.

Location : Staffordshire, UK

Injured : 0 **Dead** : 0

Abstract

A fire occurred at a fine chemicals facility damaging a pumphouse and outside storage. No one was injured in the incident.

An investigation into the fire is being carried out but it is thought that a possible cause may have been due to the ignition of one of eight organic chemicals.
[fire - consequence, damage to equipment]

Lessons

[None Reported]

10334September 1998

Source : BBC ONLINE NETWORK, INTERNET, (<http://www.bbc.co.uk>).

Location : , UK

Injured : 6 Dead : 0

Abstract

Six workers were taken to hospital after a 100,000 gallon water tank collapsed and badly damaged a whisky plant.

Contractors were carrying out routine maintenance on the tank at a bottling plant when the accident happened.

The tank ruptured and flooded the whisky plant with thousands of gallons of water.

Considerable damage occurred, the pump room was destroyed completely and there was structural damage to some other buildings. The cause of the incident is not yet known.

[damage to equipment, processing]

Lessons

[None Reported]

Source : FIRE PREVENTION 331, APRIL 2000.

Location : Gilberdyke, Humberside, UK

Injured : 0 **Dead** : 0

Abstract

A fire occurred in a factory warehouse where waste rubber was processed and remoulded into tyres.

At the time of the incident a worker was welding a bracket in a metal container and had burned through the container's metal wall, which resulted in sparks and molten metal falling onto the floor. The sparks and molten metal ignited diesel residue under an adjacent tank. The building was destroyed in the fire.

Estimated loss is thought to be £810,000.

[fire - consequence, damage to equipment, metal - molten]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

An incident at an ethylene plant. A crane had completed a lifting operation on the previous day. The driver was asked by contractors to look at another job, and when moving the crane, collided with an overhead pipe track. The direct cause was the crane jib being left in the upright position whilst the crane was being driven away.

Personnel congregating at a muster point spilt onto the road and delayed emergency services getting to the scene.

Damage was sustained by two flare lines, but later declared fit for use following leak and pressure testing. Planned flare operations were suspended whilst the lines were inspected. Damage to the pipe-bridge was relatively minor and it was declared fit for short-term use.

[collision, pipeline, transportation, damage to equipment

Lessons

A notice was issued to all of the contracting company's crane drivers informing them of correct procedures.

An indicator to be installed in the front cab of all cranes to inform the driver when the jib was in the upright position.

Improved control of crane and other large vehicle movements on site, with risk assessments as necessary.

Further familiarisation of the Fire and Emergency Service shift teams.

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]

Source : HERTFORDSHIRE COUNTY COUNCIL, FIRE & RESCUE SERVICE. (<http://www.fire-uk.org>)

Location : Furneux Pelham, Hertfordshire, UK

Injured : 0 **Dead** : 0

Abstract

A fire occurred at a local factory used for manufacturing timber goods. The fire occurred within a dust extraction and saw mill building, resulting in both the building and several nearby stacks of timber to be engulfed in flames by the time fire crews arrived. A severe shortage of water at the remote locality hampered fire fighting efforts and necessitated a regular shuttling of water from a local supply. Nevertheless, by 02:40 hrs the fire was under control, tackled using three jets and nine sets of breathing apparatus.

[fire - consequence, solids processing equipment, damage to equipment, product loss]

Lessons

[None Reported]

Source : CHEMICAL HAZARDS IN INDUSTRY, SEPTEMBER 1999.

Location : , GERMANY

Injured : 0 **Dead :** 0

Abstract

An explosion occurred in a chemical plant. The incident occurred during production of toltrazuril, an ingredient used in production of a parasiticide.

It was originally thought that the explosion occurred during production of a fungicide.

Apparently a worker used potassium hydroxide instead of potassium carbonate in a reaction with 2-chloro-5-toluene and dimethyl sulphoxide.

The plant was completely destroyed.

[operator error, accidental mixing, processing, damage to equipment]

Lessons

[None Reported]

1044806 June 1998

Source : CNN.COM, U.S. NEWS, 1998,
(<http://www.cnn.com>).

Location : , GERMANY

Injured : - Dead : 102

Abstract

A rail transportation incident. A high speed train crash killed 102 people. Evidence suggests that a wheel that might have broken from material fatigue could have caused the carriage directly behind the locomotive to derail. Parts of a broken wheel were found some six kilometres (four miles) ahead of the bridge. The train is believed to have derailed at a switch 300 metres (yards) before the bridge.

The locomotive uncoupled from the train, which then hurtled into a road bridge as the cars behind jack-knifed into one another. The road bridge collapsed on several cars, crushing the passengers inside.

[metal fatigue, wheel broken, derailment - consequence]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, JULY 16, 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 perform 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 : Harrisburg, USA

Injured : 0 **Dead :** 0

Abstract

An ammonium hydroxide tank collapsed releasing an unknown quantity of the chemical. The cause is not known.

[spill, unidentified cause]

Lessons

[None Reported]

12767May 1998

Source : CHEMICAL HAZARDS IN INDUSTRY, JUNE 2000,; MADDEN, G. (SOUTH GLOSTERSHIRE ENVIRONMENTAL SERVICES, UK) ENVIRONMENTAL HEALTH JOURNAL, FEB 2000, 108(2), 46-48.

Location : Bristol, UK

Injured : 0 **Dead** : 0

Abstract

An underground fuel pipeline was damaged during planned maintenance work forcing two families to be moved out of their homes. Approximately 27,000 litres of kerosene were recovered following the incident. It is estimated that approximately 500-900 litres has been lost to ground. [evacuation, spill, excavation damage, damage to equipment]

Lessons

[None Reported]

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]

Source : ICHEME

Location : , UK

Injured : 1 Dead : 0

Abstract

A packed section of a column which had been steamed and water washed caught fire causing damage in excess of \$200,000 (1998). "Smoke" was seen issuing from the top manway, emergency services were called to supply extra water and the majority of manways were closed.

The following causes were found:

1. Air ingress into the VDU main column through opened manways triggered a pyrophoric reaction, even though the packed bed temperatures were measured at below 40 degrees C.
2. Probably poor distribution of cooling water leaving some sections of the packed bed unwashed.
3. Existing thermocouples and other monitoring arrangements were insufficient to detect local hot spots.

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

Lessons

[None Reported]

10397February 1998

Source : BBC NEWS, INTERNET, 1998,
(<http://www.bbc.co.uk>).

Location : Esmeraldas, ECUADOR

Injured : 70 **Dead** : 11

Abstract

An oil pipeline explosion. The explosion followed an oil leak and sent a ball of flames through a nearby community, destroying many houses and spilling oil into a nearby river.

Many people threw themselves into the river as a huge fireball made its way down the pipeline. Around 70 people were injured, some with severe burns.

It took more than five hours to bring the blaze under control. Rescue efforts were hampered by water shortages.

About 500 people were evacuated to a military base nearby and were not allowed to return to their homes until the pipeline was declared safe.

[evacuation, transportation, damage to equipment, fatality, injury]

Lessons

[None Reported]

9059 18 January 1998

Source : CNN.COM, U.S. NEWS, 1998, (<http://www.cnn.com>).

Location : , RUSSIA

Injured : 24 Dead : 4

Abstract

A methane gas explosion occurred in a coal mine. The explosion occurred during the overnight shift, when 49 miners were inside the mine at a depth of nearly 3,000 feet.

The blast caused the shaft where the miners were working to collapse and set off a fire that raged throughout the day.

Methane, a naturally occurring colourless and odourless gas that seeps out of coal seams, can build up in poorly ventilated mine shafts and is easily ignited by a spark.

[fatality, mining, injury]

Lessons

[None Reported]

1040218 January 1998

Source : LOSS PREVENTION BULLETIN, 139, 22.; CNN INTERACTIVE, 18 JANUARY 1998, (<http://www.cnn.com>).

Location : , RUSSIA

Injured : 5 Dead : 4

Abstract

A methane gas explosion at a coal mine killed at least four people, injured five and trapped some twenty five others.

The blast caused the shaft where the miners were working to collapse and set off a fire that raged throughout the day. Emergency crews had trouble extinguishing the blaze and navigating the debris to reach those trapped.

The explosion occurred during the overnight shift, when forty-nine miners were inside the mine at a depth of nearly 3000 feet.

[fire - consequence, fatality, injury, mining]

Lessons

[None Reported]

1040507 January 1998

Source : LOSS PREVENTION BULLETIN, 139, 22-23.; THE CHEMICAL ENGINEER, 15 JANUARY 1998.

Location : , USA

Injured : 8 Dead : 3

Abstract

An explosion occurred on an explosive at an explosives plant killing three people. The flattened both main buildings at the plant and the explosion was reported to be felt twenty miles away, and was registered as a magnitude two by seismologists. The cause of the explosion is not known.
[damage to equipment, fatality]

Lessons

[None Reported]

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

Location : Kentucky, USA

Injured : 1 Dead : 0

Abstract

A fire occurred at a fertiliser plant causing severe damage to the building and the evacuation of 2,500 people within two miles of the surrounding area. The basement of the plant contained 400 tonnes of ammonia nitrate and fears of applying water or foam to the fire which could create dangerous vapour clouds and cause a toxic run-off into the nearby river.

Firefighters avoided run-off by building an impromptu dike and plugging two underpasses and there were no toxic plumes or any odour reported.

[fire - consequence, damage to equipment, processing]

Lessons

[None Reported]

121371998

Source : NUCLEAR SAFETY NEWSLETTER/ HEALTH AND SAFETY EXECUTIVE, FEB, 1999.

Location : , UK

Injured : 0 Dead : 0

Abstract

A leak of clean water occurred from a valve in the outlet of a cooling coil line from a high active storage tank which came into contact with some pre-existing deposited contamination and became contaminated. The drain from the collection facility for such leaks had previously been blocked. An analysis of the situation at the time of the blockage indicated that removal of the blockage was not reasonably practicable due to high dose rates and the situation was judged to be acceptable because there was an alternative drain point. Unfortunately, the analysis did not recognise that the volume.

[storage tanks, flow restriction]

Lessons

[None Reported]

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

Abstract

A contractor sustained six fractured ribs and bruised legs when brick fire insulation around the skirting of a redundant visbreaker column collapsed on top of him.

The immediate cause of the accident was the collapse of unsafe brickwork during the demolition process due to the following causes:

1. The removal of bricks from the bottom of the skirt making the structure unsafe.
2. No formal plan and risk assessment of the job.
3. Inadequate control of the proposed method for the job.

[design or procedure error]

Lessons

1. Never undertake demolition work without a detailed plan which has been scrutinised through a risk or task analysis.
 2. Ensure full-time supervision during demolition work and control each part of the job with a work permit.
-

106051998

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An on-line crude unit heat exchanger vent line was fractured during a lifting operation. The strap/webbing sling being used to install a tube bundle into the shell of the lower of a pair of horizontal heat exchangers came into contact with the vent line and fractured it releasing approximately 32 barrels of crude oil into the area. There were no injuries or fires.

The immediate cause of the spillage was a failure in the preparations to ensure that the crane operation could not damage equipment on the crude unit. The basic cause was a failure to provide a method statement and formal risk assessment for the crane lift and ensure that the vent line was adequately protected or decommissioned.

[design or procedure error, damage to equipment]

Lessons

[None Reported]

124331998

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An electrical fault occurred on oil filled switchgear in the main electricity intake substation of a chemicals plant. The fault resulted in a serious fire, which lasted for 2 hours and destroyed a section of a 3-section switchboard.

The incident eventually caused the loss of all electrical power to the site. The plant was shutdown.

Fortunately no one was injured.

The cause of the incident was due to an earth fault that occurred, probably in the cable box, downstream of a circuit breaker panel. This earth fault raised the voltage sufficiently to cause the failure of the centre-phase insulator between the busbar oil compartment and the circuit breaker oil compartment in panel 5 resulting in a second, more serious, busbar earth fault. This failure appears to be a random failure on a normally inaccessible component.

An investigation into the incident revealed that the key/key way clearances were too large and the torsional loads were carried by the dowel pin. The pin was overloaded and failed, and the half shaft blew out of the non return valve body.

The high energy of the arc (~7.7 MW), caused a severe over pressure in the circuit breaker oil tank which then burst and deposited the ignited oil in the cellar.

The fire in the cable cellar, melted the glands on other cables, letting the cable box grease fall into the cellar, also providing fuel for the fire. The fire also caused the incomer panel cable box, which has oil filled cables, to fail resulting in even more oil deposited into the fire spreading in the basement.

[electrical equipment failure, plant shutdown, fire - consequence, damage to equipment, lack of earthing]

Lessons

[None Reported]

Source : LLOYDS LIST, 31 DEC, 1997.

Location : , USA

Injured : 0 Dead : 0

Abstract

A fire occurred whilst drillers obtaining soil samples ruptured a pipeline carrying natural gas. Nearby business were evacuated and the road was closed off.
[exploration, sampling, fire - consequence, evacuation, transportation]

Lessons

[None Reported]

Source : CHEMICAL HAZARDS IN INDUSTRY, JUNE 2000,; HEALTH & SAFETY BULLETIN, NOVEMBER 1998, (273); 2.

Location : , UK

Injured : 2 **Dead :** 0

Abstract

Two workers were exposed to plutonium particles at a laboratory during dismantling of pipework from a redundant glove box. Two companies involved in the incident were fined, one £14,000 (1998) and the other £4,000 (1998).

[laboratory work, contamination, safety procedures inadequate, injury]

Lessons

[None Reported]

Source : ICHEME

Location : , POLAND

Injured : 0 Dead : 0

Abstract

A small fire occurred on the joint/gasket of a heat transfer oil line.

The fire was extinguished, the damage was estimated at \$7,000 (1998). There were no injuries, product spillage or escalation of the fire.

It was later found that the joints/gaskets on the system were of the incorrect material for the hot oil duty.

Investigations into the cause of the incident confirmed that the fire started from a leaking joint/gasket on the ring side flange of a 20mm (three quarter inch) branch valve. This caused hot oil at 260 degrees C and 1.5 bar pressure to soak the insulation on the main heat transfer line.

Spontaneous ignition had most likely occurred as a result of oxidation of the heat transfer oil that had dispersed into the process insulating material.

[fire - consequence, heat transfer, damage to equipment, incorrect equipment installed, joint failure, gasket failure]

Lessons

It is not uncommon for oil soaked insulation to reach the auto-ignition temperature due to the oxidation and exothermic reaction. In this case, the auto-ignition temperature of the oil was 350 degrees C with a flash point of 208 degrees C.

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , INDONESIA

Injured : 0 **Dead :** 0

Abstract

Mud burst from the ground near an onshore crude oil well after an explosion. Eruptions followed the withdrawal of the drill from the well which then caused a leak. Natural gas leaked from 11 different spots. 200 houses nearby were damaged as a result of the explosion and 1400 people were evacuated.
[exploration, evacuation, gas / vapour release, damage to equipment]

Lessons

[None Reported]

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]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , AUSTRALIA

Injured : 3 **Dead :** 0

Abstract

A fire caused damage to two electrical generators in the engine room of an offshore platform.

An initial investigation pointed to a mechanical problem in one of the five turbines in the generator. The vessel was taken to a shipyard for repair. 60 days interruption.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , USA

Injured : 0 **Dead :** 0

Abstract

A 24 inch natural gas pipeline was punctured by a maintenance work crew. The damaged section was closed down and repairs initiated. Flow was curtailed for a day.

[damage to equipment, human causes, transportation, gas / vapour release]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A carry over of phosphorous oxychloride to a vent scrubber reacted with water causing overpressurisation damage. A polypropylene drain line was damaged and production loss occurred.

[unwanted chemical reaction, damage to equipment]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, NOV. REUTER.

Location : , FRANCE

Injured : 0 Dead : 1

Abstract

An explosion and fire occurred at a fireworks killing one person, rockets sprayed hundreds of metres and several parked cars were set ablaze.
[fire - consequence, damage to equipment, fatality, processing]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, NOV. LLOYDS LIST.

Location : Alberta, CANADA

Injured : 0 Dead : 0

Abstract

A split of a weld joint led to the rupture of a 64,000 litter tank, a cloud of hydrochloric acid spread over 30 km, residents sealed up homes and stayed in doors.
[material of construction failure]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 5 Dead : 2

Abstract

Severe damage occurred to a steam turbine when a compressor on ammonia plant refrigeration failed killing two people and injuring five others.

The failure of the turbine rotor resulted in the steam, let down from 97 bar superheated at 496 degrees C, mixed with lubricating oil. The release enveloped five employees in the area of the turbine and compressor.

An investigation concluded that the incident was a result of a combination of errors, which occurred in a sequence which provided the opportunity for the turbine failure.

[damage to equipment, fatality, mechanical equipment failure, gas / vapour release, injury]

Lessons

[None Reported]

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]

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]

Source : HAZARDOUS CARGO BULLETIN, 1997, NOV. REUTER.

Location : , TAIWAN

Injured : 0 Dead : 0

Abstract

An explosion occurred on a gas pipeline which was accidentally ruptured by workers. The leaking gas ignited by sparks from passing motorcycles.
[human causes, transportation]

Lessons

[None Reported]

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.

Source : HAZARDOUS CARGO BULLETIN, 1997, NOV. LLOYDS LIST.

Location : Chittagong, BANGLADESH

Injured : 0 **Dead** : 0

Abstract

A marine transport incident. A stern mooring line on a tanker parted during cargo discharge, the ship swung in a strong ebb tide damaging the jetty, shore lines and an adjacent bulk carrier.

[damage to equipment, material transfer]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, NOV. LLOYDS LIST.

Location : , ARGENTINA

Injured : 12 Dead : 0

Abstract

An explosion occurred in a tank of non-gas free marine tanker in a dock for maintenance, the deck plating was ripped off.
[damage to equipment]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, NOV. LLOYDS LIST.

Location : , USA

Injured : 0 Dead : 0

Abstract

A marine transportation incident. A utility tug towing a barge struck a brightly lit oil platform in clear weather, minor damage occurred.
[collision, damage to equipment]

Lessons

[None Reported]

1137820 August 1997

Source : BLAYE DISASTER: SOME FACTS AND INTERIM CONCLUSIONS. SEBTI CHAABANE H&S UNIVERSITY OF BORDEAUX.

Location : , FRANCE

Injured : 0 **Dead :** 10

Abstract

A dust explosion occurred on the cereal plant when the 30 metre high, 54,000 tonne grain silo collapsed and buried everything on the ground under tonnes of grain and concrete. The cost to restart the plant is estimated at 7 to 8 million French francs (1997).
[silo/hopper, fatality, operational activities]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , INDONESIA

Injured : 0 **Dead :** 0

Abstract

A blowout and subsequent fire resulted in an offshore platform catching fire and later sinking into the sea. Two nearby fields were shutdown as a precaution.
[fire - consequence, plant shutdown]

Lessons

[None Reported]

Source : THE SAFETY AND HEALTH PRACTITIONER, APRIL, 1997.

Location : Iowa, USA

Injured : 0 Dead : 0

Abstract

Contractors carrying out spot welding on the steel doors of an explosive magazine ignited the fireworks within. Approximately 17 tones of fireworks were consumed in the fire. Fortunately no one was injured but in addition to the destruction of the stock, the magazine suffered considerable damage. A permit to work system was not operated containing advise on precautions.

The company was fined £1000.

[explosion, fire - consequence, damage to equipment, permit to work system inadequate]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, SEP. REUTER.

Location : , INDIAN OCEAN

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. A bulk carrier laden with iron ore was in collision with a sea mount, sever keel damage occurred, fortunately there was no pollution.

[damage to equipment]

Lessons

[None Reported]

8929 26 July 1997

Source : HAZARDOUS CARGO BULLETIN, 1997, SEP. LLOYDS LIST.

Location : , OFF SINGAPORE

Injured : 0 Dead : 0

Abstract

A marine transportation incident. A container ship sustained serious damage when in collision with a laden tanker, no pollution occurred.
[damage to equipment]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, SEP. LLOYDS LIST.

Location : , CANADA

Injured : 0 Dead : 0

Abstract

A marine transportation incident. An anchored chemship awaiting pilot was struck by a bulk carrier damaging the bow, fortunately no pollution occurred.
[damage to equipment, collision, near miss]

Lessons

[None Reported]

7964 20 July 1997

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , INDIA

Injured : 0 Dead : 0

Abstract

A crude oil floating roof tank, which had not been in operation since 13 July 1997, was struck by lightning. Only a portion of the seal of the tank was damaged by a fire.

[fire - consequence, damage to equipment, storage]

Lessons

[None Reported]

1163816 July 1997

Source : LLOYDS LIST, 19 JUL, 1997.

Location : , IRELAND

Injured : 0 Dead : 0

Abstract

Dense smoke drifted over a town when a fire caused people to be evacuated within 300 metres and 500 metres down wind. Contaminated water was contained.

[fire - consequence, gas / vapour release, evacuation, contamination]

Lessons

[None Reported]

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

A second plug inserted into a "U" tube reactor blew out while the shell side of the Alkylation Unit's "Exchanger/Reactor" was pressurised with nitrogen at 50 psi to detect leaking tubes. The plug blew out as the craftsmen were about to drive it in, spraying a mist of liquid on to the face shield of one of the craftsmen. The reactor had been prepared in accordance with the procedure to test for leaking tubes. The reactor had been blocked in, depressurised and drained. The shell side had been caustic washed to neutralize any alkylation acid and the reactor was blinded off from the acid settler. When the front cover plate was removed, some residual liquid was found in the bottom of the channel head and fire water was used to flush the channel head and tube sheet area. Dry nitrogen at 50 psig was then used to pressure up the shell side of the exchanger in order to find the leaking tubes. As this is a "U" tube bundle, the bottom leaking tube is usually found to dribble liquid out with the nitrogen. When a plug is driven in this end, then the top end of the leaking tube has to be found by detecting the escape of nitrogen. The top plug was put in place with the nitrogen pressure still applied on the shell side and tapped into place. The craftsmen were then preparing to drive the plug in completely when it blew out, spraying a mist of liquid on to the face shield of one of the craftsmen.

There is no written maintenance procedure specifically for repairing a leaking "U" tube in the reactors at Alkylation Unit. There is a Job Aid for repairing a leaking exchanger tube and the most significant difference between the Job Aid and the typical practice at the Alkylation 2 is that the Job Aid calls for water to be used to fill up the shell side of the exchanger and then this is pressurised up (if necessary) to detect tube leaks. The investigation team discussed this at length and agreed that the use of nitrogen for the Alkylation Unit's reactor/exchanger is acceptable and can be done safely. The Job Aid, however, does specifically call for the shell side to be depressurised and drained before tube plugs are installed. Plugging a reactor tube while there is still nitrogen pressure on the exchanger shell was not typical practice. Nitrogen is normally blocked in and allowed to depressure first. The craftsman alleges that he was directed to attempt to plug the leaking tube while nitrogen pressure was still on the shell. The technique of inserting and driving home a plug does not require the craftsmen to enter the channel head area, as he uses an extension piece to reach into the tube sheet and insert the plug. This means a confined entry permit is not required. However, to detect which tube is leaking requires the inspectors to use a portable instrument which detects the sound of a leak. To use this instrument they must climb into the channel head, following the issue of an entry permit by the safety inspector. The safety inspector had been called for a confined space entry permit, and was present when the plug blew out. He had refused to issue the confined space entry permit, advising the operator that the nitrogen had to be blocked out and the shell depressurised.

A safety inspector will not issue a confined space entry permit until the nitrogen is disconnected from the reactor shell. However, the corrosion inspector must have the nitrogen connected and under pressure for the instrument to "hear" the leak. Accordingly, the typical practice is for the nitrogen to be disconnected from the shell, have the shell depressurised and obtain a confined space entry permit. After this, pressurise the shell and enter the channel head area to use the instrument to detect the leak. The investigating team agreed that this was an unacceptable practice, because as soon as nitrogen is used to repressurize the shell the conditions of the confined space entry permit are invalid.

[reactors and reaction equipment, maintenance, tube, heat exchanger, reactor tube, design or procedure error, blowout, permit to work system inadequate, entry into confined space]

Lessons

The following recommendations were made:

1. Failure to have a detailed procedure with a task analysis and periodic observations for unusual jobs will lead to attempts to short cut normal practices.
2. Gas under pressure has a great deal of potential energy waiting to be released. Plugs under pressure whether in heat exchanger tubes or furnace tubes present a potential hazards.
3. A robust permit to work system is essential to prevent accidents.

Source : LOSS CONTROL NEWSLETTER, 1997.; LLOYDS LIST, 14 JUL, 1997.

Location : , CANADA

Injured : 100+ Dead : 0

Abstract

An entire recycling plant was destroyed in the fire. Air was contaminated with benzene and hydrogen chloride released by the burning 400 tonnes of PVC which was being stored at the site. At least 100 firemen were reported as being ill, having worked at the scene. Residents within 8 blocks were evacuated. [fire - consequence, contamination, gas / vapour release, storage, evacuation, injury]

Lessons

[None Reported]

8936 08 July 1997

Source : HAZARDOUS CARGO BULLETIN, 1997, SEP. REUTER.

Location : , ECUADOR

Injured : 0 Dead : 0

Abstract

An explosion occurred allegedly due to a fire which could not be controlled at a military base ammunition store. 20 buildings in 2km radius were damaged.
[fire/explosion, damage to equipment, storage]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , UK

Injured : 0 **Dead :** 0

Abstract

A gas release occurred when workers ruptured a gas main. The leak was quickly repaired. People in nearby houses were forced to evacuate. The gas was dispersed using high pressure water spray.

[gas / vapour release, evacuation, pipeline, maintenance]

Lessons

[None Reported]

1198207 July 1997

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A small fire occurred on a plant after a solvent (ethyl acetate) leak from a pump, the plant was shutdown. Subsequently a storage tank overflowed approximately 10 tonnes.

[fire - consequence, plant shutdown, storage tanks, spill, pump failure]

Lessons

[None Reported]

1136406 July 1997

Source : LLOYDS LIST, 2 JUL, 1997.

Location : , COLOMBIA

Injured : 0 **Dead** : 0

Abstract

A spillage of crude oil occurred due to an attack on a pipeline, which caused it to rupture. The crude oil field which serves the pipeline was shut down until repairs were carried out.

[terrorism, transportation]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , USA

Injured : 0 **Dead :** 0

Abstract

Power failure due to lightning caused a plant to shut down for approximately one hour. Safety valves, which opened automatically when the plant shut down, released large plumes of gas over the plant. These were not toxic.

[power supply failure, plant shutdown, gas / vapour release, safety relief valve, operational activities]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG. LLOYDS LIST.

Location : Texas, USA

Injured : 0 **Dead** : 0

Abstract

An explosion and fire occurred in an oilfins plant causing damage to buildings.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , BELARUS

Injured : 0 **Dead :** 0

Abstract

Pollution occurred over 70 hectares of marshland when 500 tonnes of crude oil spilled due to the rupture of a nearby pipeline. The damaged section has been blocked off and work is being carried out to pump out the spillage of oil.

[material of construction failure, transportation]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG. ENERGY DAY.

Location : Louisiana, USA

Injured : 0 **Dead** : 0

Abstract

A gas well blowout occurred on a rig/posted barge. The barge caught fire and dry gas flowed and burned until capped.
[offshore, fire - consequence]

Lessons

[None Reported]

8907 16 June 1997

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG. REUTER.

Location : Magurchhara, INDIA

Injured : 4 Dead : 0

Abstract

A blowout fire occurred on a gas field causing four injuries and fears for a nearby forest.

[fire - consequence, injury]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , BANGLADESH

Injured : 4 **Dead :** 0

Abstract

A fire broke out after drilling operation hit trapped gas. The drilling rig and all equipment were destroyed. It took approximately 1 month to extinguish the blaze. Thousand of villagers were evacuated from the area. Total losses as a result of the fire were approximately US\$50 million (1997).
[drilling/digging/ploughing vehicles, damage to equipment, evacuation, fire - consequence, exploration, product loss, drill, injury]

Lessons

[None Reported]

1135912 June 1997

Source : LLOYDS LIST, 13 JUNE, 1997,; CHEMISTRY IN BRITAIN AUGUST, 1997.

Location : , UK

Injured : 4 Dead : 0

Abstract

A fire occurred at an ink blending factory.

Hundreds of people were evacuated after a massive fire at a chemical plant when drums of printing inks exploded sending black clouds over the town. All 3 production units destroyed.

An investigation into the incident found that the probable cause of the fire was due to a faulty heater.

The fire destroyed 50% of the building and approximately 100 tonnes of printing ink, 90 tonnes of varnish and 30 tonnes of solvent.

A loss of £1.17 M (1997) was estimated.

[fire - consequence, explosion, evacuation, damage to equipment, mechanical equipment failure, normal operations, injury]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG. LLOYDS LIST.

Location : Lagos, NIGERIA

Injured : 0 **Dead** : 4

Abstract

A marine transportation incident. Two explosions occurred in the ballast of a chemical tanker at anchorage during welding caused by naphtha vapours. Considerable damage to the tanker occurred.
[damage to equipment, fatality]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , GULF OF MEXICO

Injured : 0 **Dead :** 0

Abstract

Blowout at gas well while drilling. The drill string broke above water and release of natural gas occurred. Thirty nine people were evacuated from the rig.
[offshore, gas / vapour release, evacuation]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , RUSSIA

Injured : 0 **Dead :** 0

Abstract

A spillage of 386 tonnes of crude oil occurred following the rupture of a pipeline. 17 tonnes spilt into the Black Sea. Clean up operations involved removing 500 tonnes of contaminated earth. About 700 persons involved in the clean up operations.

[pollution]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG. LLOYDS LIST.

Location : , JAPAN

Injured : 0 Dead : 0

Abstract

A marine transportation incident. An liquefied natural gas (LNG) carrier collided with a fishing vessel causing damage to the port side and bulwark.
[collision, damage to equipment]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG. REUTER.

Location :

Injured : 0 Dead : 0

Abstract

A military ammunition dump exploded, 1,000 houses, a school and other buildings were damaged.
[explosion, damage to equipment]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG. OGJ.

Location : Lousiana, USA

Injured : 0 **Dead** : 0

Abstract

A pipeline carrying oil from wells ruptured causing a spillage of 700 tones.

Lessons

[None Reported]

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, NOV.

Location : Texas, USA

Injured : 0 **Dead** : 0

Abstract

An explosion and fire occurred in an alkylation unit releasing a mixture of propane, isobutane and HF (hydrofluoric acid/hydrogen fluoride) from a ruptured feed line. The HF was dispersed into the atmosphere by the fire's updraft. An estimated 20 barrels of HF was diluted by fire fighters.

Tests did not indicate an HF release in the surrounding neighbourhood.

[fire - consequence, leak, spill]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG. OGJ.

Location : Texas, USA

Injured : 0 **Dead** : 0

Abstract

Approximately 715 tonnes of oil spilt over 10 acres from a ruptured pipeline, earthen trenches were built and vacuum trucks were used in the clean-up.
[transportation, spill]

Lessons

[None Reported]

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 met 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.

Source : ENERGETIC EVENTS, THE NEWSLETTER OF WILFRED BAKER ENGINEERING INC.

Location : , CHINA

Injured : 20 Dead : 7

Abstract

An explosion occurred during the production of emulsion explosives in a factory. The accident killed seven workers and injured twenty. The production line was totally destroyed and surrounding buildings were damaged. Only a crater of 6.6m in diameter and 2.8m in depth was left.

[damage to equipment, fatality, processing, injury]

Lessons

The most important lesson learned from this accident is the significant sensitivity of the emulsion matrix before sensitisation. This was verified by sensitivity tests conducted by the investigation team. Under room temperature, cartridges of emulsion matrix (100mm in diameter and 3kg in weight) completely detonated by a single No.8 detonator. The detonation of regular 32mm cartridges of emulsion matrix was not complete when initiated by a single No.8 detonator because the minimum detonation diameter of matrix under room temperature conditions is well above 32mm. Experiments also showed that this critical diameter decreases significantly with the increase of temperature. Experiments conducted in several other factories also proved the above data.

In this incident the ignition source was not clearly defined. However, the inner diameter of the emulsifying kettle was 600mm and was operated under the temperature of 85-100 degrees C. The system was well above the critical conditions of detonation propagation. Severe extrusion and friction due to extraordinary agitation conditions may have resulted in local overheating which may have served as the initiation source. In particular, the operating conditions on the production lines were abnormal because a new composition, with much higher viscosity, was being produced. This high viscosity composition was a mis-match with the existing emulsifying machine.

The factory also had a tunnel which connected production buildings. The consideration was to protect the workers from the rain since the factory was located in the area with a rain-forest climate. Tunnel like structures to be avoided because they will direct blast waves during an explosion. In this incident, the confined tunnel structure functioned as a shock tube. The building at the other end of the tunnel, which was far away from the explosion centre, suffered heavy damage from the blast. It's doors and windows were broken out due to the directional blast effect of the tunnel which it faced.

Source : LOSS CONTROL NEWSLETTER, 1997,; CHEMICAL HAZARDS IN INDUSTRY, OCTOBER 1997.

Location : , USA

Injured : 0 Dead : 0

Abstract

A fire resulted from the failure of a large pump. 50% of production was lost as a result of the incident. The company makes hexamethylene diamine for the production of nylon. The fire dramatically affected nylon fibre supplies for a couple of months. The cause of the pump failure is thought to have been due to metal fatigue.

[fire - consequence, pump failure, product loss, operational activities]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A fire occurred in a powder degassing bin on a petrochemical plant. This resulted in shut-down of production for 12 days and extensive damage to the bin. This was despite correct operation of the bursting discs protecting the system following an initial explosion. The damage was caused by the subsequent fire. The decision was made not to recommission the damaged bin and only operate with the remaining units in the medium term. No evidence was found for abnormal operation prior to the incident or for production of increased quantities of powder fines. The investigation blamed a weak powder explosion caused by an incendive discharge. It was found that some of the socks fitted to the degassing bin bag filters were of the wrong material. These were specified as containing 5% of conductive threads. Examples were found with both 0% and 2%. The material had been changed by the supplier without notification. There were also weaknesses in the earthing arrangements of the damaged bin. Some internals were also found to be missing from valves on the discharge side of the degassing blower. Finally some inadequacies were found in the emergency standing orders which led to nitrogen not being used to quench the fire. There was also some delay in alerting the site Emergency Response Team.

[fire - consequence, plant shutdown, damage to equipment, operation inadequate, design or procedure error, normal operations, container

Lessons

1. Purchasing arrangements were inadequate to ensure supply of technically correct material and should be improved.
 2. The reliance on conductive content, even if it had been adhered to, was not enough to ensure performance. A standard measure of resistivity was needed.
 3. The emergency standing instructions should be improved to cover fires.
 4. The bursting discs operated correctly.
 5. The response of the operating team and respective fire services was satisfactory.
 6. There was some confusion in alerting the site Emergency Response Team.
-

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG. STATUS WEEKLY.

Location : Ronningen, NORWAY

Injured : 0 **Dead** : 0

Abstract

A plate suffered a blowout followed by a loud bang when a rupture disc broke during a reactor shutdown. 1,800kg of ethylene gas escaped.
[reactors and reaction equipment, leak, bursting disc]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, NOV. OGJ.

Location : , TAIWAN

Injured : 0 Dead : 0

Abstract

A rupture occurred in a pipeline resulting in the spillage of 500 bbl of oil. Serious pollution occurred to crop land, freshwater and fishing.
[ecological damage, transportation]

Lessons

[None Reported]

Source : ENDS REPORT, APR, 1997.

Location : , UK

Injured : 0 Dead : 0

Abstract

One hundred and fifty tonnes of chloroform leaked from a ruptured filter on a pipeline supplying a fluorochemicals plant. The leak continued for four hours before it was detected and halted. Most of the chemical soaked into the ground but a small amount was recovered from an interception trench and by dredging of the nearby canal.

[operational activities]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 1 Dead : 0

Abstract

A contractor was removing a scaffold in the boiler house collapsed from heat stress and fell whilst working above an access well in the turbine room. The temperature was 42 degrees C (107 degrees F). The contractor fell a distance of approximately 5 m, sustaining serious facial injuries.

The incident occurred when at 7:45 am on April 3 ,1997, three contract scaffolders signed on in the boiler house control room to remove scaffolding, work that had begun the day before. The scaffold had been erected around the whole of the perimeter of the turbine floor in order to safely install cabling for the evacuation alarm system and it was in two layers. The top layer had been removed the day before. The lower layer crossed a brick wall well that contained steam lines to the desuperheater. The well was covered with non-bearing beams made up of lagging/insulation materials. The injured scaffolder had been working for 45 minutes removing scaffold directly above a 125 psi lagged steam line when he fell into the well section and onto the non-load bearing beams. The structure collapsed with a loud noise, and he fell a further 3 m to the floor in an avalanche of debris.

The investigating team felt that not enough consideration had been given to the special hazards associated with this job, especially the high temperature of 42 degrees C encountered, and the height. Hazards associated with this work had been considered and recorded as low risk. The completed risk assessment form notes that some consideration had been given to the prevailing heat and noise, and a verbal briefing had been given by the chargehand reminding those involved to take a "break when necessary." The investigating team concluded from the documents that the hazards were not picked up because there was very little, if any, communication between those doing the job and the local operations personnel. The work environment and heat stress contributed significantly, and the investigating team felt that there is probably a low level of understanding of the consequences of each. The potential for this incident to have been a fatality is obvious. The investigating team checked for the possible presence of amine in the atmosphere but concluded this was not possible.

The following action was taken:

1. Review the risk assessment process to ensure the appropriate knowledgeable people are involved at all levels.
2. Communicate the effects of heat stress to all staff.
3. Introduce the use of fall arresting equipment and support, with appropriate training, for all unprotected work areas above 2 m.
4. Improve the quality of tool box talks by turning every significant incident into a briefing to help communicate, and measure that this is done by signed returns and audits.
5. Provide clearer guidance for what an investigation should achieve, and how quickly.
6. Any non-load bearing area should be clearly marked so that it is not missed.

[scaffolding, fall, people, maintenance, safety procedures inadequate, management system inadequate, design or procedure error, injury]

Lessons

1. Always involve people familiar with the working area when assessing risks.
2. Assess the potential for heat stress during maintenance work.
3. Use fall arrestors for all unprotected tasks at heights above 2 m.
4. Ensure all information on the work permit is communicated to and fully understood by those performing the job.

9002 01 April 1997

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, SEP.

Location : , AUSTRALIA

Injured : 3 Dead : 0

Abstract

A storage tank ruptured releasing 11,600 litres of sulphuric acid.

[storage tanks, spill]

Lessons

[None Reported]

2202 23 March 1997

Source : LOSS CONTROL NEWSLETTER, FEB, 1997.

Location : , UK

Injured : 0 Dead : 0

Abstract

A pipeline was ruptured by a mechanical digger involved in road surfacing operations. It took about 6 hours to contain the leak.
[drilling/digging/ploughing vehicles, spill, natural gas]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , USA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. A marine barge capsized after it hit a bridge in fast moving currents. Nitrogen was pumped into the barge to lessen the risk of fire. The volatile cargo of benzene and gasoline was removed and the barge righted.

[vessel overturned, collision]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 **Dead :** 0

Abstract

The 10 inch natural gas liquids (NGL) pipeline ruptured 50 ft below a creek bed while a construction crew were laying a parallel pipeline. Blow-down valves closest to the rupture were opened to de-pressurise an 8 mile section of the line. While repairs were being carried out, product was diverted to a nearby pipeline. The local community was evacuated as a result of the incident and release.
[material of construction failure, evacuation]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , INDIA

Injured : 0 Dead : 0

Abstract

Blowout at crude oil well caught fire and covered a 3,000 sq metre area. Flames leapt 30-40 metres into the air. Two villages were evacuated. The drilling rig collapsed following the fire. Capping was not expected to be completed for about 60 days.
[fire - consequence, evacuation, exploration]

Lessons

[None Reported]

Source : LLOYDS LIST, 18-21 FEB, 1997, LOSS CONTROL NEWSLETTER, JAN, 1997.

Location : , RUSSIA

Injured : 0 Dead : 0

Abstract

A spill occurred of about 1,500 tonnes of crude oil of which 400 tonnes went into the Volga after pipeline ruptured while under repair. A 60 ft section of the pipeline was replaced.

[transportation, pollution, material of construction failure]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , NEW ZEALAND

Injured : 0 Dead : 0

Abstract

A fire occurred at the top of a large 10 sq. metre mound of sulphur. A toxic cloud of sulphur dioxide release spread over the nearby town but was contained within an hour to the immediate site.

[gas / vapour release, contamination, fire - consequence, storage, environmental]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, 1997.

Location : , USA

Injured : 0 Dead : 0

Abstract

A break in a 26 inch natural gas pipeline sent a huge fire ball visible 30 miles away. There was also an apparently unrelated break in the pipe 220 miles away. The ruptures were caused by stress on the pipeline created by land movement.
[fire - consequence, earth movement, transportation]

Lessons

[None Reported]

9028 09 February 1997

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, AUG.

Location : Texas, USA

Injured : 0 Dead : 0

Abstract

Three hundred and thirty pounds of liquid, mostly water but containing 1.5% acetic acid was released. The spill occurred when a control valve failed on a solvent stripper.

No injuries were reported and contamination was minimal.

[mechanical equipment failure, valve failure]

Lessons

[None Reported]

Source : FIRE PREVENTION 325, OCTOBER 1999.

Location : , UK

Injured : 0 Dead : 0

Abstract

An explosion occurred within the production line of an aerosol plant causing a fire and injuring three workers. A call to the fire brigade was done immediately after the explosion occurred.

The brigade managed to contain the fire to the packing area, which contained large quantities of cardboard and plastic.

The Health & Safety Executive carried out an investigation and ascertained that after being filled with butane gas, the cans were placed in a warm water bath of approximately 55 degrees C for a few minutes to raise the pressure in the cans from 3 bar to 7-8 bar. At this pressure if there was a weakness in a can then it would show and the gas would vent to fresh air.

To eliminate the problem of the water overheating a device raised the cans out of the water at a pre-set temperature. There was a second with a thermostat that monitored the water's temperature.

It is thought that on this occasion the first device was set too high a temperature and due to a modification earlier in the day, the thermostats had been bypassed. These circumstances resulted in excessive pressure in the aerosol cans and a number of them split, releasing a gas cloud that appears to have travelled outside the immediate vented area to a source of ignition.

[fire - consequence, modification procedures inadequate, high pressure, rupture, leak, normal operations, aerosol propellant]

Lessons

[None Reported]

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, JUL.

Location : , NETHERLANDS

Injured : 3 **Dead :** 1

Abstract

An explosion occurred in a pipeline. The pipe which was used for transporting titanium tetrachloride, was undergoing maintenance work when the accident occurred, the pipe was being pumped with water following aeration with nitrogen. Extensive damage was caused and the installation will be out of action for a considerable period.

[transportation, damage to equipment, fatality]

Lessons

[None Reported]

9004 27 January 1997

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, SEP.

Location :

Injured : 0 Dead : 0

Abstract

An accident occurred at a pesticides factory, releasing about 1 tonne of phenylurea herbicide isopropuron. The production area and neighbouring industrial and residential buildings were contaminated. The herbicide has been produced for 20 years and is not mutagenic, teratogenic, irritant or sensitising, but as a precaution, workplace air and production workers urine have been regularly monitored and in-house "no observable effect levels" have been established. After decontamination measures were taken, biomonitoring was carried out on 168 workers. The pesticide was determined via its metabolite by liquid chromatography. From the 454 analyses done, 299 were below the detection limit of 50 microgrammes per litter. In the production area, only one analysis exceeding the in-house limit. Levels in neighbouring plants were much lower still, with a mean value just above the detection limit.

[leak, spill, processing, contamination]

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]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

The electrical supply substation No.10, located in this power station, failed. The loss of electrical supply to equipment and other substations shutdown the refinery, power station, and cross-site plants were affected either as a direct result of power loss or indirectly via steam, cooling water, and instrument air failure.

The substation load is typically 18 to 22MVA and prior to the incident was steady at 21.3MVA. The substation voltage was controlled using on load tapchangers to compensate for changes in load and supply voltage.

Normally three transformers are used to supply power however, one of the transformers, had been taken out of service on January 14 for maintenance.

Power voltage from the local grid was falling slowly but remained within its tolerance and tapchange operations were being used to maintain the Substation voltage.

At approximately 16:54 hrs. on January 20, in response to a reduction in the 33kV voltage from the local grid, the taps were successfully adjusted from position 11 to position 12 on the other two transformers. At approximately 17:05 hrs. the 33kV voltage was continuing to fall and a request was made to carry out a further tapchange operation. The operators who had carried out the previous tap change operation went to the transformers to carry this instruction out. The tap change from tap 12 to tap 13 for one transformer was completed successfully. However, when the other transformer tap change was initiated, the mechanism started to move toward tap position 13 but then turned back toward position 12. Recognising that something was amiss, the operators contacted the electrical control room for further instructions. About the same time both transformers tripped and electrical power to Substation 10 was lost.

Immediate action to investigate the cause of the loss of power and to restore power was taken by personnel on site. During these activities some time was lost locating the correct key for the transformer compound which is non standard, and in carrying out some of the switching operations. The switching arrangements for the circuit breakers in No. 10 substation vary. Some may be operated locally others only from remote locations and the 11kV incomers for No. 10 Substation have obsolete synchronization interlocks which delayed their closure. In addition some confusion arose during the incident as to which transformer had caused the incident and this effected the sequence in which the transformers were re-energized.

The power station electrical control room staff were inundated with a large number of alarms during the incident and with telephone calls from other plants seeking information. This had the effect of hindering their analysis and management of the incident.

The immediate cause was the loss of power when the two transformers feeding the substation were tripped by their electrical protection system.

The basic cause of the failure was probably the differential relay becoming unstable during a routine tap change operation on one of the two transformers. The loss of one transformer would cause the other to trip on overload.

[electrical, electrical equipment failure, plant shutdown, electrical substation, transformer, utility failure, processing]

Lessons

The following recommendations were made:

1. Tight operating tolerances which require frequent operator intervention are certain to increase the risk of error.
2. Incidents that impact a number of plants require special emergency response plans. These should be prepared and periodically tested during a dry run exercise.
3. Radios and telephones are life saving devices in refinery emergencies and require a secure back-up power.
4. A system for managing alarms should be considered for all major plant emergencies.

Source : HAZARDOUS CARGO BULLETIN, 1997, NOV.

Location : Zambia, AFRICA

Injured : 0 **Dead** : 0

Abstract

A rupture occurred on a crude oil pipeline causing pollution. A recent evidence of further leakage results from split oil filtering down from the pipeline trench and through to the ground water. The pipeline was in a poor state of repair due to the lack of maintenance.

[human causes, spill]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 134, 24.

Location : ,

Injured : 0 **Dead :** 2

Abstract

An incident occurred with a liquefied gas powered vehicle. The driver had difficulty in starting the vehicle and activated the choke. This apparently allowed an explosive gas/air mixture to accumulate near the starter. On turning the ignition an explosion and flash flame occurred, which damaged the tubing from the gas bottle so that liquid/gas sprayed out. Another worker attempted to close the valve but the worker's clothing ignited, with a bystander also seriously burned. Both victims died as a result of their injuries. Fatality.

[road vehicle, damage to equipment]

Lessons

The following recommendations were made:

1. The working group on the fork lift trucks and on the use of liquefied gas made recommendations to avoid further accidents.
 2. These included precautions with the choke (only to required for older vehicles) and measures to avoid gas accumulation.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

During routine inspection it was noted that rust stains were showing on paint work on the boot of an low pressure separator, at an interface with insulated and non-insulated areas. On removal of the insulation, an area of corrosion 50 mm X 25 mm X 8 mm deep was revealed. The corrosion was caused by the stainless steel cladding making contact with, and cutting through, the protective coating and into the carbon steel vessel. Water ingress and galvanic corrosion then exacerbated the problem.

[pressure raising/reducing equipment, damage to equipment]

Lessons

The following recommendations were made:

Engineers are reminded of the risks of corrosion from galvanic action where dissimilar metals may come into contact.

Rust staining should be investigated.

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, SEP.

Location :

Injured : 1 **Dead :** 0

Abstract

A located in a drain line of a diluent dryer at a polyethylene plant, blew out whilst the dryer was being prepared for registration. The operator was showered with glass and liquid isobutane, receiving minor cuts, a scratched eye and cold burns to the face. Possible causes of the incident were overpressure of the drain line or failure of the sight glass below its rated pressure. Neither of these was established as the cause of the accident.

[overpressurisation, blowout, draining]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Excessive damage was caused to a gas compressor seal by the outer seal leak pressure detectors failing to detect a sudden rise in seal gas (nitrogen) pressure, the result of a partial failure of the seal. The compressor continued to run with a damaged seal for a further 27 minutes before finally tripping on high vibration. The high pressure compressor seals subsequently required changing.

The seal gas pressure detectors are "smart" transmitters ranged 0-800 mbarg with an alarm at 300 mbarg and a trip at 600 mbarg connected into a PLC for machine control. If pressure is applied to a "smart" transmitter in excess of its calibrated range it will create a "transmitter failure" alarm for the duration of the over-range condition. Once a transmitter failure alarm is initiated, no further alarms can be created. Trials were carried out and a pressure of 1 barg of air was applied to the "smart" transmitters in a short period of time. The transmitter went into over-range condition and failed to register any alarm or trip condition. Once a transmitter failure occurs, the trip function is inoperative.

[instrumentation failure, seal failure, damage to equipment, processing, process control & instrumentation]

Lessons

The following recommendations were made:

Control engineers to review the use of "smart" transmitters on applications with alarm or trip functions.

Consideration to be given to modifying the control circuit on all "smart" transmitters which have a trip function to ensure that, in the event of transmitter failure, a trip will be initiated.

An alternative consideration may be to slow down the speed of response from the normal 300 msecs to a maximum of 16 seconds using the hand configurator to allow the high pressure alarm to be initiated before any transmitter failure alarm is created by overpressure.

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, NOV.

Location : Louisiana, USA

Injured : 0 **Dead** : 0

Abstract

A fire occurred outside a main production area and burned for 45 minutes. Only minor damage was sustained and no damage to the production equipment occurred.

[fire - consequence, processing, damage to equipment]

Lessons

[None Reported]

121921997

Source : CHEMICAL ENGINEERING PROGRESS, JANUARY 2000.

Location : ,

Injured : 0 **Dead :** 0

Abstract

An explosion occurred on a chemical plant causing severe injuries and damage to the plant. The explosion happened when an internal failure and blowout of a 36-inch diameter check valve occurred.

[damage to equipment, mechanical equipment failure]

Lessons

[None Reported]

122251997

Source : CHEMICAL HAZARDS IN INDUSRTY, FEBRUARY 2000.

Location : South Wales, UK

Injured : 0 **Dead** : 0

Abstract

A company was fined £10,000 (2000), for polluting a watercourse with transformer oil. Allegedly the company was aware that one of it's transformers was leaking, but continued to top up the oil until it eventually contaminated the ground and was washed into a tributary.

[pollution, human causes, contamination]

Lessons

[None Reported]

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, SEP.

Location : , UK

Injured : 1 **Dead :** 0

Abstract

A water supply station has been closed following contamination of a nearby stream with lindane. An open drum containing 20lbs of lindane powder was found in the stream. A woman who put her hands in the stream was burned and dead fish have been found. An emergency clean-up operation has been carried out.

[ecological damage, burns, drums, leak]

Lessons

[None Reported]

114961997

Source : CHEMICAL HAZARDS IN INDUSTRY, JUNE 1999.

Location : , USA

Injured : 46 **Dead :** 1

Abstract

A leak of flammable mixture of hydrocarbons and hydrogen from a ruptured pipeline occurred resulting in an explosion and fire. One person was killed and forty six injured.

An investigation into the incident found that management and supervisory staff did not make sure that emergency procedures were followed.

[fire - consequence, fatality, management system inadequate, injury]

Lessons

[None Reported]

Source : EUROPEAN CHEMICAL NEWS, 1997, 30, JUN, 6, JUL.

Location : Texas, USA

Injured : 0 **Dead** : 0

Abstract

An explosion and fire occurred on a cracker causing the shut down of a 860,000 tonne/year plant for months. Damage was caused to the compressor, furnace, purification train and cooling tower.

[damage to equipment]

Lessons

[None Reported]

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

During a monthly reconciliation inspection of a gasoline tank, it was discovered that the water bottom had virtually disappeared. When the inspector and tank farm operator returned on the following morning to check the dip, an oil leak from beneath the tank floor was visually evident. Investigations later revealed there had apparently been a low level leak from the tank since it was last filled in October 1996, and the leak increased significantly on December 31. Approximately 125 tonnes of product had leaked out. A major incident was declared at the site at 10.30 hrs., and gasoline was transferred out of the tank and water injected to re-establish the water bottom. Recovery of gasoline from the spill in the bund (dike) commenced that evening.

The tank farm consisted of six motor spirit storage tanks. The tank levels are monitored by a monitoring system at the central control room. Tank level information is then transferred to the refinery operating system and at every midnight into the information system. Within the monitoring system, a "deadband" of 12 mm was set within which the tank is defined as "inactive" - i.e., not moving. This means that an alarm is initiated if the tank level indication falls or rises by 12 mm. If the deadband is reset after an alarm, the original set-point is lost. There was no record of alarms and therefore no "trending" of a possible longer term leak.

All the motor spirit tanks had been inspected within the relevant code inspection period and had their repair recommendations carried out. There had been two previous floor failures, one of which involved the same tank in December 1985. No under floor corrosion was evident and following repair, the tank floor was vacuum box tested and fluorescent tested before returning to service.

A change in temperature of less than one degree is sufficient to change volume to activate the deadband alarm. The deadband alarm associated with these tanks has been seen as a "nuisance alarm" by the various shifts, and past inspections in reactions to alarms showed no evidence of leakage.

Loss reconciliation shows a loss of 573 tonnes with the possibility that part of a further 400 tonnes in pipe work probably contains some water.

[tank failure, rupture, storage]

Lessons

The following recommendations were made:

1. Open up the tank for cleaning for inspection as quickly as practicable to determine the nature and cause of failure.
 2. Review dead band alarming and the potential for nuisance alarms and discuss problem with operating teams.
 3. Make immediate efforts to empty two of the remaining "in service" tanks, one for inspection and one to be available for receipt in the unlikely event a problem arises with another tank.
 4. Repeat a loss reconciliation following the next tank movement to ensure all pipe work contains motor spirit, so that a full and final reconciliation can be made.
 5. Complete recovery operation and quantify the amount of gasoline recovered.
 6. It is important that the long term level trend of infrequently moved tanks be monitored to detect any low level leak.
- Frequent "nuisance" alarms must be thoroughly investigated; otherwise, they will be ignored in a real alert.

8655 05 December 1996

Source : LLOYDS LIST, 1996, DEC, 14.

Location : Florida, USA

Injured : 2 Dead : 0

Abstract

A rail transportation incident. 1,200 gallons of fuel spillage when youths operated a switching device which caused the derailment of a rail tanker. \$1 million (1996) damage done.

[derailment - consequence, damage to equipment]

Lessons

[None Reported]

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

Location : La Plata, ARGENTINA

Injured : 0 Dead : 2

Abstract

A flare knockout drum on plot overfilled and liquid slug ruptured flare line leading to major fire. Numerous pipelines BLEVE'd (Boiling Liquid Expanding Vapour Explosion). Main propane bullet protected by water deluge. Fatality.
[fire - consequence, overflow, processing]

Lessons

[None Reported]

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.

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

Location : Off Corpus Christi, USA

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. An oil marine tanker containing ballast struck an unmanned gas platform 15 miles east of Port Aransas. Damage to legs of platform.

[damage to equipment, offshore, collision]

Lessons

[None Reported]

8471 13 October 1996

Source : EUROPEAN CHEMICAL NEWS, 1996, OCT, 21.

Location : Texas, USA

Injured : 0 Dead : 0

Abstract

Plant ruptured while being brought back on stream following maintenance work. Substance involved: acrylic acid.

[Start-up]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A 6 inch untreated/raw naphtha line failed catastrophically near the base of the vacuum tower and the outflow autoignited. Both the reformer and the naphtha hydrotreater depressured in less than 15 minutes through the ruptured pipe. The resultant torch fire and subsequent fires from leaking flanges and pipe failures burned for approximately 10 hours. Two flare connections failed which contributed significantly to the duration of the fire as the plant was being shutdown and depressured to the flare system. Property damage is estimated at \$10 million (£5.9 million) (1996). Commercial loss is estimated at \$20 million (£11.9 million) (1996) as units, not directly affected by fire, were shutdown for weeks and the vacuum tower was down for over two months. An environmental release of FCC catalyst affected areas outside the plant, as the various units were shut down.

Untreated naphtha from the crude units were combined into a single stream prior to introduction into the naphtha hydrotreater. The failure occurred in the line from one of the crude units, downstream of the last exchanger and prior to the point where the two streams join. The naphtha line was at normal conditions prior to the incident at approximately 450 psig and 600 degrees F (317 degrees C). There were no indications from any of the alarms or any of the nearby employees that there was any problem with the line immediately prior to the fire. The piping was originally installed in 1965 and specified as aluminised (or "Alonised" as it is referred to) carbon steel piping. "Alonising" is an old process, no longer in common use for process piping, performed mainly to enhance the resistance of steels to high temperature, high sulfur environments. Although this piping was in service for over 30 years, sections of this same line near the failure had experienced only slight-to-moderate pitting and had retained nearly its original wall thickness.

[pipeline failure, fire - consequence, damage to equipment, autoignition, processing]

Lessons

The following recommendations were made:

1. Ensure that potential corrosion problems are adequately addressed with appropriate expertise and level of management.
2. Develop an action tracking system for all recommendations resulting from investigations, HAZOPS, audits, etc.
3. Re-evaluate piping inspection program.
4. Consider outside review of mechanical integrity program to share and incorporate best practices.
5. Replace alonized carbon steel pipe in high temperature/high sulfur services.
6. Consider amending emergency response plan to include call-out of personnel to assist in operational shutdown of units in major emergencies.
7. Emergency response drills should consider shutdown and isolation procedures and review of location of valves and switches.
8. Review the procedures in place for the emergency operation center and staging area including the need for a checklist and registration of first responders.
9. Develop a site specific plan for industrial hygiene exposure assessment on and off site during emergencies.
10. Review the adequacy of stationary fire protection in heavily congested areas.
11. Review the location, identification and accessibility of emergency isolation valves and switches.
12. Review the adequacy of existing emergency communication and notification systems within the refinery.
13. Make certain inspection thickness monitoring locations are sufficient to detect localized corrosion.
14. Conduct external audits of inspection programs and associated data management systems every 5 years to ensure continual mechanical integrity improvement and sharing of best practices.
15. Review adequacy of fire protection systems in congested areas and particularly for flare lines.
16. Check drainage in plant areas to remove expected quantity of fire water.
17. Ensure that all emergency systems are clearly identified and accessible.
18. Additional operational assistance is required in major emergencies to secure the safe shutdown or operation of other units.

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 babbitt 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.

8636 01 September 1996

Source : LLOYDS LIST, 1996, SEP, 3.

Location : Antwerp, BELGIUM

Injured : 0 Dead : 0

Abstract

Warehouse of polyethylene caught fire and collapsed.

[fire - consequence, warehousing]

Lessons

[None Reported]

8638 29 August 1996

Source : LLOYDS LIST, 1996, SEP, 12.

Location : Turov, BELARUS

Injured : 0 Dead : 0

Abstract

Transportation. Up to 400 tonnes of oil leaked from pipeline following rupture.

Lessons

[None Reported]

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.
-

8635 24 August 1996

Source : LLOYD LIST, 1996, AUG, 28.; NATIONAL TRANSPORTATION SAFETY BOARD, 1998, (<http://www.nts.gov>).

Location : Lively, Texas, USA

Injured : 0 **Dead** : 2

Abstract

A transportation incident. An 8-inch diameter steel LPG pipeline transporting liquid butane ruptured sending a butane vapour cloud into a nearby residential area forcing an evacuation.

Two residents were killed when they entered the vapour cloud in a vehicle sparking off an explosion.

Loss of product occurred worth approximately \$217,000, (1996).

It is thought the incident occurred due to corrosion.

[explosion, evacuation, fire - consequence, fatality, product loss]

Lessons

[None Reported]

8629 10 August 1996

Source : LLOYDS LIST, 1996, AUG, 13.

Location : Ontario, CANADA

Injured : 0 Dead : 0

Abstract

A rail transportation incident. Two hundred people evacuated when a rail tanker of sulphuric acid was derailed and ruptured. Spill.
[derailment, evacuation]

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]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Heater tube rupture in a high pressure hydrogenation unit. As a result of an operational upset, the helix coil in the process heater of the 1st stage of the high pressure hydrogenation unit ruptured due to a no flow situation over a prolonged period of time. This was followed by a fire. There was damage to equipment and product loss.

Operators had made adjustments to the system in an attempt to protect the catalyst. Make-up compressors were used to purge the system free of oil with fresh hydrogen.

The cause of this incident was that operating instructions' suggestion to protect the catalyst did not set out exactly how to do it, and the operators did not understand that the system was in a lock-in situation.

[fire - consequence, faulty instructions, processing]

Lessons

Operating instructions to cover emergency situations need to be clear and reflect what is actually possible. Operator training needs to go deeper than just discussing instruction

requirements; e.g., explaining the significance of situations such as no-flow, limitations of temperature indication under no-flow conditions, and the need to seek advice from more senior staff if in doubt. Overriding of trip systems must only be done with the specified level of authorisation.

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

As a result of the change over of desalted crude tower feed pumps, a vacuum tower, on this refinery, became pressured. Vacuum tower bottoms back flowed into the 10 psi steam line and out of the relief vent stack, spraying across private and public property. The total loss is estimated at \$900,000 (£539,000) (1996), of which the clean-up cost was \$800,000 (£479,000) (1996).

[gas / vapour release, backflow, product loss, overpressurisation, operational activities, pump, line]

Lessons

The following recommendations were made:

1. Major operational changes should be carried out preferably on day shift when more people are available and avoiding the weariness of night shift. Such changes need to be carefully planned, and if possible rehearsed.
 2. Operating at rates that require flow controller bypasses to be open implies that the flow rates are beyond design capacity which may put the system at a control risk. This should be reviewed under "Management of Change".
 3. Pressure controllers are very difficult to operate on manual and this should be recognized.
 4. Compound gauges should always clearly indicate a state of vacuum or pressure to avoid error.
 5. A non-return/check valve and upstream bleed are required for all stripping steam connections to hydrocarbon service.
 6. Steam lines can achieve vacuum and the pressure in some process systems can rise above the design of some low pressure steam lines.
 7. When fractionator tower charge rates are increased or reduced there should be a plan which also sets the product draw-off rates to avoid tower flooding or pumparound loss.
-

9064 03 August 1996

Source : COPYRIGHT 1994-1996, SAN DIEGO DAILY TRANSCRIPT.

Location : California, USA

Injured : 3 Dead : 0

Abstract

A rail transportation incident. A train derailment caused two loaded tank cars to career onto their sides, causing a major spill of non-flammable alcohol and fatty acids. Three boxcars were also involved causing damage to the track.
[damage to equipment]

Lessons

[None Reported]

8624 27 July 1996

Source : LLOYDS LIST, 1996, AUG, 1.

Location : Texas, USA

Injured : 0 Dead : 0

Abstract

A fire occurred in an ethylene pipeline which damaged the pipeline and electrical installations on ethylene plant.

[fire - consequence, damage to equipment, processing]

Lessons

[None Reported]

Source : LLOYDS LIST, 1996, JUL, 29, JUL, 31, AUG, 7. LOSS CONTROL NEWSLETTER, ISSUE 3, 1996.

Location : , MEXICO

Injured : 36 Dead : 9

Abstract

An explosion occurred in a gas plant which was caused by a liquid gas leak. Three explosions were felt several kilometres away from the plant. Two natural gas plants destroyed which were capable of processing 500 million cubic ft per day.

The blasts were caused by a liquid gas leak from a remotely controlled valve during pump out of an LPG bullet for maintenance. Three explosions were felt several kilometres away from the plant. Insurance losses could reach US\$1billion. Initial property damage estimate is some US\$ 250 million with total final loss up to US\$ 1 billion including business loss

[valve failure, damage to equipment, storage equipment]

Lessons

[None Reported]

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]

8623 22 June 1996

Source : THE GUARDIAN, 1996, JUL, 23.

Location : Nebraska, USA

Injured : 15 Dead : 1

Abstract

An explosion occurred at a sugar factory which damaged 7 silos and scattered sugar over a wide area. Fatality.

[damage to equipment, storage, silo/hopper, processing]

Lessons

[None Reported]

8462 31 May 1996

Source : EUROPEAN CHEMICAL NEWS, 1996, JUN, 17, NOV, 4,; WASTE ENVIRONMENT TODAY, VOL. 19, PAGE 506, 1996, JUN, 12.

Location : Magdeburg, GERMANY

Injured : 0 **Dead** : 0

Abstract

A rail transportation incident. Derailment and explosion of four of 18 rail tankers, each carrying 50 tonnes of vinyl chloride which were consumed in the fire. Schools nearby were closed for a week. Pollution of ground water over 46,000 km² area with dioxins and other contaminants was reported.
[fire - consequence, contamination]

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]

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.

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.

Source : LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.

Location : Lisichansk, UKRAINE

Injured : 0 **Dead** : 0

Abstract

Shifting soil caused a break in an oil pipeline an a spillage of 500 tonnes of crude oil.

[excavation, damage to equipment, drilling/digging/ploughing vehicles]

Lessons

[None Reported]

8460 May 1996

Source : EUROPEAN CHEMICAL NEWS, 1996, JUN, 10.

Location : Milan, ITALY

Injured : 0 Dead : 0

Abstract

An explosion damaged one of two reactors in this phthalic anhydride plant.
[reactors and reaction equipment, damage to equipment, processing]

Lessons

[None Reported]

8786 22 April 1996

Source : EUROPEAN CHEMICAL NEWS 6, 1996, 5, DEC.

Location : Ludwigshafen, GERMANY

Injured : 0 **Dead** : 0

Abstract

Some 1.5 ton of gaseous butadiene escaped through a ruptured pipe at an 80,000 tonne per year plant. There were no injuries and damage was confined to a 30 cm long crack in the affected pipe.

[damage to equipment, leak]

Lessons

[None Reported]

Source : LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.

Location : Ryazan, RUSSIA

Injured : 0 **Dead :** 6

Abstract

A road building enterprise had rented an obsolete part of the refinery and stored hot liquid bitumen in a 10,000 m³ underground storage facility. It is thought that corrosion and a damaged power cable were involved in the explosion.
[storage equipment, damage to equipment]

Lessons

[None Reported]

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.

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.
-

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

Location : Wisconsin, USA

Injured : 0 **Dead :** 0

Abstract

A rail transportation incident. A train of 32 cars including 15 carrying propane derailed. Two rail tankers ruptured and caught fire causing a feed mill and other buildings to catch fire.

[fire - consequence, derailment]

Lessons

[None Reported]

Source : LLOYDS LIST, 1996, MAR, 8.

Location : New Jersey, USA

Injured : 0 **Dead** : 0

Abstract

An explosion in an industrial gas plant caused a fire which burnt for hours and damaged buildings.

[fire - consequence, damage to equipment, processing]

Lessons

[None Reported]

Abstract

A company specialising in the removal of redundant low-level radiation waste, removed four level gauges used to measure liquids into cans. These contained a sealed radioactive source, which emits alpha-rays. During the removal, the containers holding the source were damaged, the driver, van and car park were contaminated. The van then travelled to another destination, the contamination was only discovered at the company's premises after the week end. The correct type of container had been used but it was found to be too small.

[road transport, damage to equipment, contamination, material transfer]

Lessons

[None Reported]

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.

Location : Mylkivskyy, Chernigov, UKRAINE

Injured : 0 **Dead :** 0

Abstract

Transportation. A pipeline rupture resulted in a fire.

[fire - consequence]

Lessons

[None Reported]

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.

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

Location : Lugansk, UKRAINE

Injured : 0 **Dead :** 0

Abstract

Transportation. Explosion in a section of the north gas pipeline, led to the combustion of the gas. An 8 km section of the pipeline was isolated and the 100 metres high flame engulfed several houses, destroying four and seriously damaging seven. The fire was put out within hours.
[fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Fire at compressor suction drum at a terminal during maintenance. The drain valve of the interstage liquid drum was inadvertently opened, releasing hydrocarbons into the open drain system below the suction drum. Within seconds, the hydrocarbons were ignited. There was damage to equipment and material loss. The most likely source of hydrocarbon release was from the inadvertent operation of a level gauge drain cock by insulation technicians working in the relatively confined work area. In addition the drain cock could easily be partially opened by body contact. Also the control of the work was insufficient to prevent the incident occurring.

[fire - consequence, product loss]

Lessons

The control of maintenance/installation work adjacent to running plant needs very careful consideration as to the degree of control needed to prevent incidents. The atmospheric drainage of "light ends" on process units can be hazardous if not carefully controlled. Wherever practicable, drain valves should be double valved, locked off or otherwise protected when not in use.

Source : EUROPEAN CHEMICAL NEWS, 12-18, FEB 18, 1996.

Location : Ramat Hovav, ISRAEL

Injured : 10 **Dead** : 0

Abstract

An explosion occurred in a reactor at a bromine compounds site. An investigation was launched and was expected to focus on a boiler containing methyl chloride and bromine. Damage was not serious.

[reactors and reaction equipment, damage to equipment, reaction, injury]

Lessons

[None Reported]

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

Location : , NORWAY

Injured : 0 Dead : 0

Abstract

A fire occurred in a drilling module causing damage to electrical cables.

[fire - consequence, damage to equipment, offshore]

Lessons

[None Reported]

1303 28 January 1996

Source : LLOYDS LIST, 1996, JAN, 30.

Location : Frankfurt, GERMANY

Injured : 0 **Dead** : 0

Abstract

Toxic powder (Isoproturon) escaped following an accident in the pressurised equipment which tore a hole in the roof.
[spill, damage to equipment]

Lessons

[None Reported]

8669 24 January 1996

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

Location : , GULF OF MEXICO

Injured : 0 Dead : 0

Abstract

A fire raged for four days following an explosion in a gas well during completion of drilling. Main damage was to drilling contractor's rig. No pollution followed the blowout. Well finally capped on the 7th Feb 1996. Offshore.

Lessons

[None Reported]

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

Location : Tyumen, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Transportation. Fire damaged 60 metres of the 1,200 mm pipeline causing a stoppage at a gas pumping facility.
[fire - consequence, damage to equipment]

Lessons

[None Reported]

8670 17 January 1996

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

Location : , GULF OF MEXICO

Injured : 0 Dead : 0

Abstract

Because of severe weather following damage due to `punch through', the rig broke free of its legs. It was subsequently taken in tow.
[offshore, damage to equipment, weather effects]

Lessons

[None Reported]

Source : EUROPEAN CHEMICAL NEWS, 1996, FEB, 26.

Location : Ludwigshafen, GERMANY

Injured : 25 Dead : 0

Abstract

An explosion occurred in a diaphragm chlorine plant causing \$1.4 m (1996) damage. A cloud of hydrochloric acid, sulphuric acid and chlorine was released. The cause was a blockage in the outlet for condensed water vapour from the hydrogen system of the plant. Plastic anti-corrosion material from inside 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 drier section of the plant where chlorine is washed with sulphuric acid to remove water vapour.

[unwanted chemical reaction, damage to equipment, gas / vapour release, unwanted chemical reaction, processing]

Lessons

[None Reported]

8570 11 January 1996

Source : LLOYDS LIST, 1996, JAN, 13.

Location : Saratov, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Transportation. An oil pipeline ruptured causing 650 ft by 160 ft wide spillage only 4 miles from a river. The break was caused by construction of a by-pass route onto the main pipeline.

Lessons

[None Reported]

Source : THE CHEMICAL ENGINEER, 25 JAN, 1996.

Location : , UK

Injured : 0 Dead : 0

Abstract

Up to one tonne of concentrated sulphuric acid leaked into a beck (river) at a plant after a spill by-passed the site's treatment system. A metal tank filled with the acid was being moved into position at the site, when it toppled onto its side and ruptured. The spilt acid entered the site's drain which should have taken it to the treatment unit. But the drain was later discovered to have collapsed causing the drainage line to fill up and overflow into a storm water drain and hence discharged into the stream.

[processing, pollution]

Lessons

All drains to be surveyed on a six monthly period.

Source : THE CHEMICAL ENGINEER, 1996, JAN, 25.

Location : , UK

Injured : 0 Dead : 0

Abstract

Up to one tonne of concentrated sulphuric acid leaked into a river after a spill by-passed the site's effluent treatment system. A metal tank with the acid toppled over when being moved and ruptured.

[pollution]

Lessons

[None Reported]

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.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Catalytic poly sample cooler failure and fire. A piping coil at the water to air interface of a sample cooler, off a depropanizer reboiler in the Cat Poly Unit, failed. Hydrocarbons were released which ignited resulting in a substantial fire. The sample cooler was used only occasionally to draw samples. There was damage to equipment and material loss. It was found that aqueous corrosion of the carbon steel pipe had occurred. During normal operation, the block valves were to be in the closed position for all sample coolers; on the day of the failure, all the block valves were in the open position. This incident was caused by inadequate inspection frequency.

[inspection inadequate, fire - consequence, cooling equipment, mechanical equipment failure, processing]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 1 Dead : 0

Abstract

Compressor cover failure at a refinery. During a pressure test of a make-up compressor, there was a pressure increase in the distance piece. This, together with an insufficient vent of the distance piece to flare, led to a build-up of pressure; and the distance piece cover was blown away. There was injury and damage to equipment. This was due to design inadequate that allowed suction pressure to atmospheric to be taken over the last ring of packing versus across the full number of packing rings, which is the normal design.

Examination of ruptured door fragments showed an undetected fault running through the material.

[testing, injury]

Lessons

The distance piece vent line should be able to vent large amounts of high pressure gas in the event of total mechanical seal failure.

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.

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]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Fire on crude unit stack. A carry-over of hydrocarbon from a naphtha stabiliser to the acid gas knock out pot then went to a incinerator, where it ignited. As a result, there was thick black smoke, followed by a fire, at the common stack. The unit was immediately shut down. The disposal line from the acid gas knock out pot was engineered in 1984 to enable the transfer of condensate, but due consideration was not given to accidental carry-over of entrained hydrocarbon. There was a common assumption that this was the normal route for disposal problems, i.e., to the incinerator. Production loss \$1.8 million (1995).

[fire - consequence, product loss, processing]

Lessons

Guidelines and detailed procedures need to address the handling of abnormal conditions.

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

Location : Pulau Merlimau, 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]

Source : LLOYDS LIST, 1996, JAN, 13, JAN, 26.

Location : Komi Region, RUSSIA

Injured : 0 **Dead :** 0

Abstract

Transportation. Pipeline ruptured causing spillage of 2,800 barrels of crude oil. The rupture was attributed to corrosion. Oil polluted river.
[pollution]

Lessons

[None Reported]

Source : OIL AND GAS JOURNAL.

Location : Denver, USA

Injured : 0 **Dead :** 0

Abstract

Transportation. Pipeline rupture caused release of gas that caught fire and forced the evacuation of 150 persons.
[fire - consequence]

Lessons

[None Reported]

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

Location : Chicago, USA

Injured : 0 **Dead :** 0

Abstract

A fire, which inflicted small damage, broke out in a sponge coker unit process heater and was quickly extinguished.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : HAZARDOUS CARBO BULLETIN, JUNE 2000.

Location : Ohio, USA

Injured : 0 Dead : 0

Abstract

An explosion occurred at a commercial incineration facility. The incident involved drums containing hazardous waste. Significant damage occurred to the facility.

An investigation into the incident found that the drums contained primary and high explosive materials. The drums were not properly marked or labelled. The company was fined \$40,000 (2000).

[damage to equipment, labelling incorrect, design or procedure error, incinerator]

Lessons

Mis-classification of any hazardous material is a very serious matter because it can result in improper handling of the material by the carrier and may cause danger to emergency personnel responding to an incident.

Source : ICHEME

Location : ,

Injured : 6 Dead : 3

Abstract

Ball valve blow-out on propylene system. A ball valve failed and released liquid propylene, which lead to an explosion. The incident was caused by the ball valve being fitted in the wrong direction. There was damage to equipment damage and material loss. Fatality.
[valve failure, installation inadequate, product loss, maintenance]

Lessons

Maintenance workers must be trained not to attempt to work on any item with which they are not 100 percent familiar as to its construction, and when necessary to seek information before starting, if they have any doubts. Supervision must play a vital part in ensuring that those instructed to do a job are provided with the correct information to avoid incidents. Manufacturers drawings unfortunately sometimes leave much to be desired, which means that someone with first-hand experience of the item is very valuable in preventing incidents.

8233 01 December 1995

Source : LLOYDS LIST, 1995, DEC, 4.

Location : Venice, ITALY

Injured : 0 Dead : 0

Abstract

Transportation. An 11 km long underwater pipeline ruptured and caused a spillage of about 1 tonne of gasoline into lagoon causing moderate amount of pollution.

Lessons

[None Reported]

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]

8235 22 November 1995

Source : LLOYDS LIST, 1995, DEC, 7.

Location : Tyumen Region, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Transportation. A gas explosion and subsequent fire occurred at a pipeline causing damage of Roubles 4.3 billion. Accident caused by the erosion of a 500 mm pipe. A total of 240 metres of pipeline and an engine room were wrecked.
[fire - consequence, damage to equipment]

Lessons

[None Reported]

8215 16 November 1995

Source : LLOYDS LIST, 1995, NOV, 18.

Location : Langbank Area, Saskatchewan, CANADA

Injured : 0 **Dead :** 0

Abstract

Transportation. World's longest 34 inch pipeline ruptured for the second time in five months causing the spillage of 7,500 barrels of crude oil.

Lessons

[None Reported]

8234 13 November 1995

Source : LLOYDS LIST, 1995, DEC, 4.

Location : Vladimir region, RUSSIA

Injured : 0 **Dead** : 0

Abstract

A gas fire occurred as a section of pipeline was ruptured. Fire put out in 3 hours. Accident caused by soil shifting in the area.
[fire - consequence, earth movement]

Lessons

[None Reported]

8213 12 November 1995

Source : LLOYDS LIST, 1995, NOV, 13, NOV, 15.

Location : Vladikavkaz, RUSSIA

Injured : 0 Dead : 0

Abstract

Transportation. An explosion damaged a gas pipeline, halting gas supplies. Supplies were rerouted. Sabotage suspected.
[damage to equipment]

Lessons

[None Reported]

8212 08 November 1995

Source : LLOYDS LIST, 1995, NOV, 11.

Location : Kingston, JAMAICA

Injured : 0 Dead : 0

Abstract

An explosion at the plant destroyed the raw material warehouse causing damage estimated at \$43 million (1995).
[damage to equipment, warehousing]

Lessons

[None Reported]

8190 25 October 1995

Source : LLOYDS LIST, 1995, OCT, 26.

Location : Cilacap, INDONESIA

Injured : 0 Dead : 0

Abstract

A fire in 7 storage tanks at major oil refinery set alight by lightning. The blaze started in one tank and spread to others.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

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

Location : Bogalusa, Louisiana, USA

Injured : 400 **Dead** : 0

Abstract

A rail transportation incident. The release of nitrogen tetroxide was caused by a ruptured rail tanker. 3000 evacuated.

[evacuation, nitrogen peroxide]

Lessons

[None Reported]

1041614 October 1995

Source : LOSS PREVENTION BULLETIN, 140, 24.; HEALTH AND SAFETY EXECUTIVE, NEWS RELEASE, 9 MARCH 1998.

Location : , UK

Injured : 3 Dead : 0

Abstract

An explosion occurred during the extrusion of solid rocket fuel on a large press and involved about 55kg of the explosive repellent. The explosion and fireball devastated the press compartment and three workers in the nearby control room were badly injured.

The building collapsed, rubble from the roof and walls fell in and a fireball engulfed the workers. The force of the blast threw very large and heavy pieces of debris, including a 1.5 tonne metal securing ring up to a quarter of a mile from the building.

Investigation into the explosion found that the cause of the incident was due to the heavy securing ring not being fully engaged at the front of the extrusion press. The press was also being operated at too high a pressure. It was also found that adequate steps had not been taken to avoid contamination of the explosives by rogue metal.

[high pressure, design or procedure error, injury]

Lessons

[None Reported]

8208 04 October 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, DEC.

Location : Tobolsk Area, Siberia, RUSSIA

Injured : 0 Dead : 0

Abstract

Transportation. Major crude oil pipeline closed after being damaged. Crude oil spillage spread to an area of 600 sq. metres.
[damage to equipment]

Lessons

[None Reported]

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.

8219 October 1995

Source : THE OBSERVER, 1995, OCT, 29.; GUARDIAN, 1995, OCT, 30.

Location : Koscise, SLOVAKIA

Injured : 170 **Dead** : 11

Abstract

11 killed after a gas pipeline containing carbon monoxide ruptured. Leak. Fatality.

Lessons

[None Reported]

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

Location : Shikoku, JAPAN

Injured : 0 **Dead** : 0

Abstract

A fire in the terephthalic acid plant caused little damage during maintenance.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

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 escalation.

[fire - consequence, contamination, cracking]

Lessons

[None Reported]

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 3, 1995.

Location : Nizhniy Tagil, RUSSIA

Injured : 2 **Dead** : 0

Abstract

Four storage depots completely destroyed when 28 tonnes of salts of 2-ethylhexoic acid exploded. Windows 3 km away broken.
[damage to equipment]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1995, NOV.

Location : Aqaba, JORDAN

Injured : 0 **Dead** : 0

Abstract

An explosion of a container with nitrocellulose at marshalling yard destroyed 20 and damaged 32 containers. Spontaneous combustion suspected.
[damage to equipment]

Lessons

[None Reported]

1938 25 August 1995

Source : LLOYDS LIST, 1995, AUG, 29.

Location : Gulf of Mexico, USA

Injured : 0 **Dead :** 2

Abstract

Two men were working to depressurise piping around a platform by bleeding down a 16 inch pipeline and were killed when it ruptured.

[fatality]

Lessons

[None Reported]

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

Location : Buffalo, New York, USA

Injured : 7 **Dead :** 1

Abstract

A fire occurred in a warehouse. Preliminary cause attributed to the decomposition of sodium persulphate. 800 tonnes of sodium persulphate, ammonium persulphate and potassium persulphate were destroyed. Fatality.

[warehousing, storage, product loss, fire - consequence]

Lessons

[None Reported]

1723 18 August 1995

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

Location : Sverdlovsk, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Transportation. A natural gas pipeline rupture led to an explosion and fire.

[fire - consequence]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1995, SEP.

Location : Corpus Christi, Texas, USA

Injured : 0 **Dead** : 0

Abstract

Marine transportation. Lightning struck marine tanker barge loaded with 630 tonnes of toluene at refinery. The fire burnt out on No.3 tank but not on No's 1 or 3.
[fire - consequence, damage to equipment]

Lessons

[None Reported]

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

Location : Nagaoka, JAPAN

Injured : 0 **Dead** : 0

Abstract

Transportation. The 350 mm, 23.5 km liquefied natural gas (LNG) pipeline was ruptured by a landslide caused by heavy rains in the area. A four hour fire resulted.

[fire - consequence]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A tube suddenly ruptured in a reactor feed preheat furnace of a Resid Hydrotreater and resulted in a major fire. The mechanism of failure was creep in a relatively localised area. The incident occurred during the start-up of the unit.

The 96 Mbpd Resid Hydrotreater started operation in late 1983. It consists of three parallel modules feeding a common distillation section. Each of the modules is identical, and contains two parallel reactors, feed/effluent heat exchanger, one preheat furnace, hydrogen recycle and quench, and product separation and cooling. Each furnace has two separate radiant sections which preheat the feed to the two parallel reactors. Each radiant cell of the furnace preheats a mixture of resid feed and hydrogen to its feed temperature. Twenty-two furnace tube skin temperature indicators (TIs) are provided throughout each radiant cell. Peepholes are provided at each end of the 60 foot long firebox and at three locations along each side of the firebox. The tubes are seven inches in diameter, 0.6 inch in nominal thickness and of type 347 stainless steel.

On the day of the incident, the fuel gas valve on the furnace's north cell was fully open at a rate of 43,000 scfh from about 00:30-02:35 hrs., and the south cell was also fully open at the same rate from approximately 01:25-02:35 hrs. An operator inspected the furnace during this period and noted no obvious hot spots on the tubes or other abnormalities. Fuel gas was reduced to both cells prior to shift change to lower the skin TIs (one skin TI in the north cell reached alarm point of 1050 degrees F at 05:30 hrs.). The skin TIs cooled to 850 degrees F (454 degrees C) or less but the one TI which had alarmed remained at 950 degrees F to 1000 degrees F (510 degrees C to 538 degrees C). At no time during the startup did any TI reach the maximum design limit of 1100 degrees F (593 degrees C). surveys have revealed temperatures high enough to cause a creep failure.

Key findings from the investigation are summarized below.

1. Coke deposition occurs predominantly at or near tube welds in the furnaces.
2. The weld acts like a stiff ring - such that when creep conditions exist in the weld area the tube bulges where the resistance to stretch is less (4 inches from weld).
3. Weld thermal stabilization did not remove residual stresses from the weld to the edge of the heating blanket, test shows that after post-weld heat treatment negligible residual stresses remain.
4. The grooves found in the north cell tube 4 failure point were statistically equivalent to the grooves found in the south cell tube 12 bulge and most likely occurred from the same mechanism.
5. The grooves were not a manufacturing defect because the grooves in the south cell crossed a weld.
6. The internal grooves were a consequence of carburization and creep (very similar to boiler tube ruptures due to creep and Environmental factors such as scale).
7. There was no evidence of tube material degradation near the welds.
8. Short term stress rupture tests on tube material indicated properties at or slightly below the API 530 minimum rupture curve.
9. Due to several locations of creep characteristics being found, the overheating is most likely due to chronic conditions rather than any single event.
10. Full tube inspection, visual or IR, was not possible with the existing number of sight ports.
11. Localized overheating of the tube was not indicated by skin TIs, periodic infrared scans, or visual inspections.
12. Furnace operating policy, at the time of the incident, was to fire the furnace subject to tube skin TI, draft, CO, excess O2 and flame pattern constraints. Heat flux or fuel gas limits had not been imposed.

[reactors and reaction equipment, fire - consequence, separation equipment, cooling equipment]

Lessons

The following recommendations were made:

1. Decoking of furnace tubes to prevent coke build up and consequent localised heating should be undertaken at specified intervals.
2. Tube skin temperature alarm points should be set sufficiently lower than the maximum design temperature to allow for hot spots or localised heating.
3. IR imaging needs to be conducted frequently to supplement tube skin temperature measurements.

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]

1615 04 August 1995

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

Location : Penza, RUSSIA

Injured : 0 **Dead :** 0

Abstract

Transportation. An 18 year old pipeline ruptured along its seam and spilled diesel which contaminated at least 3,000 sq.m of land.
[contamination]

Lessons

[None Reported]

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]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A leak was discovered in the discharge pipework of an ethylene refrigeration compressor. The ethylene plant was shut down, the leak isolated and the associated pipework purged, prior to full inspection and repair.

The location of the leak was discovered at a point where a 2 inch safety valve bypass joined a 10 inch safety valve header on the compressor discharge. It was identified that the failure of the 2 inch pipe had been due to vibration induced fatigue.

The plant had been recommissioned two days previously, following a shutdown brought about by a process upset. It was estimated that 400-50 tonnes of ethylene had been lost in the 48 hours following recommissioning.

[refrigeration unit, plant shutdown, excessive vibration, normal operations]

Lessons

The enquiry team identified that monitoring of the vibration levels on pipework around the failure location should continue after the installation of new pipe supports. Monitoring and analysis results should be communicated site-wide and to others.

1751 22 July 1995

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

Location : Smethwick, UK

Injured : 0 **Dead** : 0

Abstract

A fire caused up to £1 million (1995) damage at a plastics factory when stocks of polystyrene and pallets were destroyed in a storage area but left the main factory unaffected.

[warehouse, damage to equipment, fire - consequence]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1995, SEP.

Location : Tacoma, Washington, USA

Injured : 0 **Dead** : 0

Abstract

Port operation shut-down for 4 hours due to phosphorus fire in a tank container.

[fire - consequence, plant shutdown]

Lessons

[None Reported]

1516 17 July 1995

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

Location : Samotlor Field, Tyumen, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Explosion in field was caused by the rupture of a pipeline due to corrosion. Spillage of oil covered 500 sq. metres.

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]

3358 15 July 1995

Source : EUROPEAN CHEMICAL NEWS, 1995, JUL.

Location : Almwich, Anglesey, UK

Injured : 3 **Dead** : 0

Abstract

A fire occurred at a bromine plant causing a reduction in output and damage to three blow-out towers which were shut down at the time during a maintenance period. The towers contained rubber linings and PVC resin packing.
[fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : ICHEME**Location :** , USA**Injured :** - **Dead :** 0**Abstract**

A newly constructed delayed coker unit was started at a refinery in early May of 1995. In July of the same year, a major fire occurred which resulted in substantial equipment damage and unit downtime. There were no serious injuries but the total loss exceeded \$15 million (£8,955,224), (1995).

The design feed and process parameters of the unit were such that shot coke was expected (granular coke as opposed to a solid bed). Due to known difficulties with handling of shot coke, the design included an automated coke drum bottom head removal system. The intent here was to protect the operators from the hazards of removing the bottom head. The bottom de-heading device used hydraulics, high pressure nitrogen and a movable ramp ring to seal the coke drum head prior to the introduction of hydrocarbon. Hydraulic power is used as the motive force for moving the ramp ring and lock ring used to secure the bolts. Positioning the bolts and locking them into position with the lock ring is the first step in installing the head. Following that, high pressure nitrogen is used to tension the bolts and provide enough clearance so the ramp ring can be moved into position. Hydraulic power then rotates the ring until a mechanical seal has been achieved. The hydraulic and nitrogen systems are then powered down and the drum is ready for pressure testing prior to introducing hydrocarbons. The control panels for the device are located such that the operator is shielded but able to clearly see the bottom head area.

On the day of the incident the day shift operator installed the head on Drum No.1. He proceeded with pressure testing and air-freeing of the drum and then began hydrocarbon warm-up in preparation for a drum switch later that night. The investigation revealed that the ramp rings were never closed on the drum and that the seal was provided by the nitrogen pressure. The evening shift operator completed the switch into Drum No.1 and then in his routine check of the system discovered that the head was not properly installed. He then compounded the previous error by shutting down the nitrogen system prior to closing the ramp rings. The head subsequently opened up and there was an immediate fire. The investigation concluded that the human error was the primary cause for the event. It was clear that not all of the operators fully understood how the deheading device worked and thus were unable to troubleshoot the device. It was also clear that while the procedure for operating the device was very clear, not much was said about what was going on as the different steps were occurring. It was also concluded that the safeguards to minimize the potential for operator error were inadequate given the consequences of such an event. The equipment design did not include any inherent protection against the head being mistakenly opened while the drum was in service. Additionally, the cross checking procedures in place at the time were deemed inadequate.

[fire - consequence, damage to equipment, operator error, design or procedure error, competency lacking, drums, processing, injury]

Lessons

Operators should have fully understood how the drum's de-heading device operated.

Adequate safeguards should have been in place to minimize the potential for operator error through the following:

- 1.inherent equipment design.
- 2.cross/double checking arrangements.

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 values are not established to provide a base line for comparison.

Source : LOSS PREVENTION BULLETIN, 069, 25-28; FINANCIAL TIMES, 1983, 19 SEP.

Location : , UK

Injured : 0 Dead : 1

Abstract

An explosion in the hydrocarbon recovery plant caused considerable damage to the adsorber and other equipment as it was being shutdown. Flammable gases were drawn into the blower/heater/adsorber circuit, mixed with air and ignited on a hot spot in the carbon bed. The possibility of air, vent gases and hot spots in the carbon bed had not been identified at the design stage. Fatality.
[separation equipment, design inadequate]

Lessons

The following recommendations were made relating both to improving the safety of the plant and improving procedures.

1. New procedures for shutting down and starting up the plant should be established which avoids the process use of air. The recommended procedure involves placing the bed under nitrogen cover after extended steaming followed by cooling by water flooding. This leaves the carbon bed cool and wet prior to opening up for entry and the beds should be kept wet when open for maintenance. Restart of the plant would use plant off-gas to dry the beds. For a shutdown where entry to the absorber is not required, the absorber would be simply extended steamers and left to cool down under nitrogen cover.
2. A discipline and design practice should be established to deal with programmable logic controllers. In particular functional description sequence diagrams, etc., should be prepared by the design team in terms intelligible to operating personnel and should be treated as addenda to P&I diagrams.
3. The existing temperature measuring point in the outlet gas 'Y' piece from each absorber should be relocated so as to measure both the outlet gas and the regeneration outlet gas temperature.
4. Operating instructions for shutdown and start-up will need complete revision.
5. The procedure for monitoring and controlling changes to an agreed design should be improved and method of referral back to the original design team for approval of significant changes established.
6. Changes of personnel at critical points in a project should be avoided if at all possible. If such changes occur, management must ensure that continuity is maintained and that successors are fully aware of important design and operating aspects. Overlap from design to operation is essential to ensure that operating practice does not dilute design intent.
7. It is recommended that the company guidelines for the implementation of the technical safety procedure for project development be revised.
8. To make the necessary separation of design responsibilities and the safety auditing responsibilities of technical safety group clear, with guidance on the implementation of the latter.
9. To give clear guidance on standards of reporting.
10. To state clearly the inherent responsibility of line management to ensure that the review of procedures is followed, that the scope and the depths of the reviews are adequate and that the technical safety group report gives a clear statement of activities and outstanding actions.

2721 16 June 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, AUG.

Location : Saskatchewan, CANADA

Injured : 0 **Dead** : 0

Abstract

Transportation. Rupture of 860 mm diameter Line 3 of 4 pipeline caused spillage of 2,600 tonnes of crude oil to a farm field. Flow shut off within 4 minutes.

Lessons

[None Reported]

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]

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

Location : Zhuhai, Guangdong, CHINA

Injured : 20 **Dead** : 2

Abstract

Explosion when equipment was being inspected killing two engineers and twenty others. The explosion started a fire which spread to other floors in the building housing the affected equipment and involved unknown chemicals stored in the building. Fatality.
[inspection, fire - consequence, damage to equipment]

Lessons

[None Reported]

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.

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUES 2, 1995.

Location : Surgut, Tyumen, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Transportation. A 700 mm diameter oil pipeline ruptured and a fire occurred. The fire shutdown 2 power transmission lines.

[fire - consequence, plant shutdown]

Lessons

[None Reported]

2499 22 May 1995

Source : LLOYDS LIST, 1995, JUN, 3.

Location : Tianjin, CHINA

Injured : 0 **Dead** : 6

Abstract

Explosion in building where technicians working late on a chemical substitute for musk failed to control a volatile nitrogen compound which exploded violently destroying a 3 storey building and throwing iron girders a distance of 300 metres. Fatality.
[explosion, damage to equipment]

Lessons

[None Reported]

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

Location : , GEORGIA

Injured : 0 **Dead :** 0

Abstract

Transportation. A gas pipeline damaged by an explosion was repaired and recommissioned within a week. Fire brought under control in 2 hours.
[fire - consequence, damage to equipment]

Lessons

[None Reported]

2475 15 May 1995

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

Location : Grozny, Chechen Republic, RUSSIA

Injured : 0 **Dead** : 0

Abstract

5 storage tanks damaged and 15,000 tonnes of oil destroyed in attack by terrorists using grenade launchers.

[terrorism, damage to equipment, product loss]

Lessons

[None Reported]

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]

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).

8113 24 April 1995

Source : LLOYDS LIST, 1995, APR, 27

Location : Megion Region, Western Siberia, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Transportation. A tractor ploughed into a pipeline causing its rupture and the spillage of 250 cum (cubic metres) of crude oil into the nearby river.

Lessons

[None Reported]

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.

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]

8096 21 April 1995

Source : THE GUARDIAN, 1995, APR 28,; THE TIMES, 1995, APR 28,; NEWSGRID 4-27

Location : Ukhta, RUSSIA

Injured : 0 Dead : 0

Abstract

Transportation. Rupture in a gas pipeline caused a huge fire ball. Cause attributed to the worn out state of the pipeline.
[fire - consequence]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A small explosion occurred in a transfer pipe on a chemical plant. The pipe concerned transferred product by air blowing from a vacuum drier to a silo via a cyclone.

The operator heard a dull "pop" and a line joint opened up releasing a small amount of flake material. In addition to the release there was over-stressing of a length of pipework and charring of the paintwork on the pipe.

The cause had not been established at the time the report was written. The plant was shut down pending establishment of the cause and was expected to be out of service for more than 24 hours.

[material transfer, damage to equipment, plant shutdown, unknown chemicals]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

Contractors were carrying out excavation tasks associated with improvements to a road pipe track. Foundations were being laid for retaining walls and to improve the drainage system.

A mechanical excavator damaged the external sheath on three of the four 11kV power cables feeding a plant at the chemical facility. The damage occurred close to where the cables entered a sub-station.

Following the incident it was identified that the damage was superficial and that a simple sheath repair was required.

[damage to equipment, excavation damage, drilling/digging/ploughing vehicles]

Lessons

1. One excavation certificate had been raised for the job, which was to be undertaken in two distinct phases. The first, covering trial digs to locate cables was to be carried out using hand-digging methods only. The second, for subsequent tasks, allowed for mechanical digging, subject to appropriate permission and only in areas free of cables. Two permits to work were raised and it was incorrectly assumed that these were applicable to any part of the job.

2. The Contractor had not prepared a method statement for the workscope.

3. Hand-over between Contractor personnel had failed to identify the location of the cables.

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

Location : Edgeworthstown, County Longford, IRELAND

Injured : 0 **Dead** : 0

Abstract

A road transportation incident. A road tanker containing 20,000 litres of LPG came off the road at a bend into the village and ended in the front garden of a house. Gas leaked from the tanker and about an hour later ignited and destroyed the house.

[explosion, fire - consequence, damage to equipment]

Lessons

[None Reported]

8109 08 April 1995

Source : LLOYDS LIST, 1995, APR, 8.

Location : Port Au Prince, HAITI

Injured : 0 **Dead** : 0

Abstract

A fire destroyed 40 laboratories and caused a lot of damage.

[fire - consequence, damage to equipment, laboratory work]

Lessons

[None Reported]

8108 06 April 1995

Source : LLOYDS LIST, 1995, APR, 7,; EUROPEAN CHEMICAL NEWS, 17-23 APRIL 1995.

Location : Lillebonne, Rouen, FRANCE

Injured : 0 **Dead** : 0

Abstract

An explosion and fire badly damaged a vinyl acetate plant. Initial reports indicated high pressure in ethylene pipe initiated blast.
[fire - consequence, damage to equipment, processing]

Lessons

[None Reported]

8105 04 April 1995

Source : LLOYDS LIST, 1995, APR.

Location : Novorossisk, Black Sea, RUSSIA

Injured : 0 **Dead** : 0

Abstract

A tank caught fire in oil storage area and was extinguished within 15 minutes and caused little damage.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

8107 03 April 1995

Source : LLOYDS LIST, 1995, APR, 7.

Location : Off Cirebon, Jawa, INDONESIA

Injured : 0 **Dead** : 0

Abstract

A fire on platform caused appreciable damage on various floors. 100% damage on third floor, 75% on second floor and 20% on first floor.
[fire - consequence, damage to equipment, offshore]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1995, JUN.

Location : Silver Bay, Minnesota, USA

Injured : 0 **Dead** : 0

Abstract

Burning oil sprayed from pipe destroyed electrical cables following pelletiser bearing failure. Two furnaces shut down for up to 3 weeks.
[damage to equipment, processing]

Lessons

[None Reported]

8110 31 March 1995

Source : LLOYDS LIST, 1995, APR, 13,; HAZARDOUS CARGO BULLETIN, 1995, JUN.

Location : Sydney, Australia

Injured : 0 **Dead** : 0

Abstract

A fire believed to have started in the solvent recycling plant totally destroyed plant with 20% damage to adjacent buildings.
[fire - consequence, damage to equipment]

Lessons

[None Reported]

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

Location : Wilmington, Los Angeles, USA

Injured : 4 **Dead** : 0

Abstract

Internal tank explosion which ruptured a 90,000 bbl asphalt by-product tank apparently due to build up of flammable atmosphere inside tank. The tank was 85% full of vacuum bottoms, coker feed at the time of incident. Fire continued to the following day and caused smoke inhalation difficulties to 4 operators.
[fire - consequence, processing]

Lessons

[None Reported]

8104 28 March 1995

Source : LLOYDS LIST, 1995, APR, 5.; HAZARDOUS CARGO BULLETIN, 1995, MAY.

Location : Brass River, NIGERIA

Injured : 0 **Dead** : 0

Abstract

Oil pipeline ruptured near production facility. 85,000 tonnes of crude oil spillage over 2 weeks. Sabotage by local community blamed but local community claiming \$32 million (1995) compensation.

Lessons

[None Reported]

8130 28 March 1995

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

Location : Neftegorsk, Sakhalin Island, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Earthquake 7.5 on the Richter scale caused extensive damage to the oil production operation. A 53 cm pipeline had 15 breaks. 11 pumping stations, 230 wells and 3 oil and gas gathering stations were damaged.

[damage to equipment, processing]

Lessons

[None Reported]

8519 25 March 1995

Source : LLOYDS LIST, 1995, MAR, 28.

Location : Texas, USA

Injured : 0 Dead : 0

Abstract

Transportation. Pipeline ruptured causing spillage of 100 barrels of crude oil.

Lessons

[None Reported]

8103 23 March 1995

Source : LLOYDS LIST, 1995, APR, 8,; HAZARDOUS CARGO BULLETIN, 1995, MAY.

Location : Dikson, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Pipeline ruptured at storage tank under weight of snow at airport. 1,800 tonnes of jet fuel poured over snow and ice, and then in the sea.
[storage tanks, weather effects, spill]

Lessons

[None Reported]

8518 22 March 1995

Source : LLOYDS LIST, 1995, MAR, 25.

Location : , Trinidad

Injured : 0 Dead : 0

Abstract

Transportation. A rupture in the main 30 inch gas pipeline caused by a tractor clearing land resulted in the evacuation of people.
[excavation damage]

Lessons

[None Reported]

8090 20 March 1995

Source : CHEMICAL HAZARDS IN INDUSTRY, 1995, JUL.

Location : Skarbovik, NORWAY

Injured : 0 **Dead** : 0

Abstract

Powerful explosion caused damage to buildings.

[damage to equipment]

Lessons

[None Reported]

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

Location : Chipola, Louisiana, USA

Injured : 0 **Dead :** 0

Abstract

Transportation. 36 inch gas pipeline ruptured. Leak caught fire and damaged a reported 300 feet section near the Mississippi border. No impact on deliveries as the gas had been re-routed to two parallel lines. Fire lasted 2.5 hours.
[fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A small explosion was heard and a fire spread across the hammer mill floor. The fire was brought under control in about 2 hours. Most of the damage was to electrical cables and hydraulic hoses.

The total plant outage was only 20 hours as new equipment, which was being commissioned, was brought into use to minimise the outage.

The exact cause of the incident was not clear but it was believed to be related to a previous jam in number 2 hammer mill. Hot spots or embers may have been left from this jam which was cleared less than an hour before the incident.

[fire - consequence, damage to equipment, commissioning, solids processing equipment, hot surface]

Lessons

The investigation recommended inspection of the hammer mill to ensure that the blades were sharp and that the pusher mechanism was operating correctly.

There was also a recommendation to install additional emergency lighting and ventilation as spread of smoke hampered dealing with the incident.

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]

8100 07 March 1995

Source : HAZARDOUS CARGO BULLETIN, 1995, MAY.

Location : Udmurt Republic, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Transportation. Natural gas pipeline ruptured causing massive explosion and fire. 4 sq. km. area burnt out. Soil subsidence due to melting snow suspected as cause.

[fire - consequence]

Lessons

[None Reported]

8136 06 March 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : Castle Rock, Washington, USA

Injured : 0 **Dead** : 0

Abstract

A 26 inch pipeline ruptured. The fire ball was seen 8 miles away.

[fire - consequence]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Reformer extended outage on a refinery. During a planned shut-down to regenerate catalyst, internal damage and a loss of catalyst containment occurred within the reactor system. It was found that the catalyst beds were disturbed and the seal at top of reactors lost allowing the catalyst to migrate out of reactors. The cause was due to the current regeneration procedure not adequately alerting personnel to problems during the regeneration process. Current data and tracking capabilities did not indicate any potential problems within the reactors.

Loss including \$3.5 million (1995) and £2.1 million (1995) in lost opportunity.

[damage to equipment, product loss, reactors and reaction equipment, safety procedures inadequate]

Lessons

Procedures acceptable over many years still need review when operating parameters are changed e.g., feed rates, feed quality, and severity of operation.

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : Chiapas, MEXICO

Injured : 22 Dead : 1

Abstract

Transportation. Flames leapt 50 m in the air following an LPG pipeline explosion, causing knock-on damage and secondary explosions at two other pipelines.

Fatality.

[fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, MAR.

Location : , NORTH ATLANTIC

Injured : 0 Dead : 0

Abstract

A marine transportation incident. A leak from a tank container occurred aboard a container ship. The frame of a tank container buckled during a storm at sea, causing damage to the tank shell and discharge valve and the loss of some eight tonnes of product (a solution of sodium borohydride and sodium hydroxide in water) occurred. This compound, UN number 1760, is a Class 8 corrosive product and releases hydrogen when in contact with metals. When discovered the frame around the tank container was seen to be bent and the discharge valve was damaged. The crew attempted to staunch the leak but was only partially successful.

[weather effects, damage to equipment, spill]

Lessons

[None Reported]

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]

Source : HSE NEWS RELEASE.**Location** : Sutherland, UK**Injured** : 0 **Dead** : 0**Abstract**

During operations at a residue recovery plant the radiation monitors went into alarm. The plant was shut down and the area evacuated. A detailed survey of the area was made where no significant contamination was found and the plant restarted. The pressure in the main glovebox was then found to be increasing gradually and air activity monitors went into alarm and the plant was shut down and evacuated for the second time. It was subsequently confirmed that the pressurisation of the glovebox had been caused by a leak in the compressed air hoses of a centrifuge drive combined with a blockage in the glovebox filter.

[radioactive, evacuation, plant shutdown, processing]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 148, 18.**Location :** ,**Injured :** 0 **Dead :** 0**Abstract**

One of three cranes lifting a pile cluster weighing 260 tonnes failed catastrophically causing the load to fall and sustain damage whilst the crane itself was wrecked totally. The cluster fell against an offshore oil jacket under construction but did little damage. There were no injuries to personnel.

Losses Sustained:

- Total loss of one crane
- Six days on positioning of the cluster
- Monetary loss due to recalculations, clearance of site, revision of procedures, subsequent testing and inspection of lifting equipment
- Damage plate and zinc anode and subsequent rework
- Re-scaffolding of jacket
- Cost of investigation

Immediate Causes:

- Failure in communication between project planners and lift crew. The lift crew were given a procedure, which did not include a documented description of the crane movement. The lift crew were given a procedure, which did not include a documented description of the crane movement. The lift crew devised movement procedure and relayed verbally to others
- Further failure in communication as there was no evidence of briefings on procedures, reviews or execution of plan. No evidence of interface meetings between contractor and subcontractor existed.
- Inadequate warning devices in the crane. The crane was not equipped with a device which would allow the operator to see whether he was working within safe limits, nor was there any means of boom angle measurement.
- Equipment was inadequate to do the job and did not have sufficient capacity to give an adequate factor of safety.

Conclusion:

The investigation into the incident concluded that the boom brake failed on the crane whilst being subjected to an overload, causing the boom to fall out of control. The subsequent impact of the load on the ground and whiplash effect caused severe shock loading to the sleuthing ring. The hook and house rollers sheared, part of the counterweight weighing 8 tonnes was dislodged and fell to the ground.

This particular counterweight would have fallen off the crane as it was tipped forward since it was found under the right hand track. The momentum of the counterweight then sheared the crane's upper works from the base tractor unit with consequence sliding to the final position. The boom fell across the jacket to the final position. This prevented the crane falling completely over.

Whilst the slings used did not contribute to the incident, there was evidence that the identification, certification, selection and testing of slings had been subjected to abuse which had reduced their lifting capacity.

[damage to equipment, design or procedure error, operational activities]

Lessons

The following lessons were learned:

1. All cranes should be tested to good industry practice standards.
2. Records of preventative maintenance, certification, inspection and test should be available on site.
3. A heavy lift specialist should be available for defined critical lifts.
4. Visual/audible alarms should be available on all cranes.
5. Slings which are doubled during a lift should be destroyed.
6. Procedures should be comprehensive.
7. Movement and lift procedures for critical lifts should be reviewed by appointed heavy lift specialists.
8. Procedures should be in place to clearly state roles, responsibilities and lines of communication.
9. A quality plan should be developed for lifting operations.
10. Critical programme elements should be subjected to more proactive management supervision.

8514 03 February 1995

Source : LLOYDS LIST, 1995, FEB, 6.

Location : Senglea, MALTA

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. A large internal tank explosion in a chemical tanker ruptured ship. The ship spent 3 days at a tank cleaning facility prior to work on the vessel in the dry docks.

Lessons

[None Reported]

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : Shandong Province, CHINA

Injured : 57 **Dead** : 10

Abstract

Transportation. A massive gas pipeline blast destroyed a busy city intersection and neighbouring power transmission lines as city commuters were returning home. Extensive damage to roadside buildings. Fatality.
[damage to equipment]

Lessons

[None Reported]

1797 31 January 1995

Source : LLOYDS LIST, 1996, FEB, 2.

Location : North Sea, NORWAY

Injured : 0 Dead : 0

Abstract

Oil production halted after fire which was extinguished in half hour. Concern that electrical cables damaged. Offshore.
[fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1995, DEC.

Location : ,

Injured : 0 Dead : 0

Abstract

A road transportation incident. 3 one tonne IBC (intermediate bulk containers) filled with polyester amide (toxic substance) broke through the side of an unaccompanied curtain sided trailer and fell onto the deck. The trailer contained 17 IBC.

[damage to equipment]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A fire occurred in a final degasser on a plant. At the time of the incident the plant was in the process of starting up, soon after a production operator heard an unusual noise and thought he could smell burning. The operator identified the degasser as the source of both and noticed smoke emitting from the degasser cyclone vents. The control room was informed and the fire station was contacted. The damage sustained to the vessel was minor.

The maintenance costs amounted to £140 K (1995).

[fire - consequence, start-up, damage to equipment]

Lessons

The report stated the following conclusions:

1. The incident was caused by loss of full fluidisation in the final degasser, creating a stagnant area of high hydrocarbon concentration within the vessel. At a localised fluidised air/hydrocarbon interface a flammable atmosphere developed and was ignited by static from the fluidised powder bed. The resulting flame front initiated combustion of the polymer powder within the vessel.
 2. The final degasser ws partially fouled with a build up of old powder, polymer strings, agglomerated and tiles when powder withdrawals from the reactor were recommissioned. This was probably the root cause of loss of full fluidisation in the degasser.
 3. Ineffective degassing could potentially lead to the creation of flammable atmospheres in downstream powder silos.
-

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : Kobe, JAPAN

Injured : 0 Dead : 0

Abstract

There have been notifications of plant damage in the area although the scale of this has yet to be fully established.
[damage to equipment, earthquake]

Lessons

[None Reported]

8495 21 January 1995

Source : LLOYDS LIST, 1995, JAN, 24, JAN, 25.

Location : Lac sur Sables, Shawinigan, CANADA

Injured : 0 Dead : 0

Abstract

A rail transportation incident. 28 cars of a 44 car train were derailed causing the spillage of 50,000 gallons of sulphuric acid into the river. The pH of the river was down to 3.7 at the spill and 5.0 16 km away. Limestone was added to the river. Investigation showed that one tanker split open completely, 10 tankers tipped into the lake and, that of these, 6 leaked, while 5 other tankers lost some of their contents. 10 of the 11 cars that lost their contents had damage to the top assembly and rupture disc due to the shield being insufficient.

[damage to equipment, pollution, inadequate guarding, derailment]

Lessons

There was a lack of shielding on the tanker domes.

8541 18 January 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : Atlantic Ocean, NIGERIA

Injured : 10 Dead : 10

Abstract

A fire resulted from a suspected gas leak during maintenance welding activity resulting in loss of 85,000 bpd of production. Minor damage to the production platform includes electrical cables and process control & instrumentation equipment. Fatality.
[offshore, fire - consequence, damage to equipment]

Lessons

[None Reported]

1023 15 January 1995

Source : LLOYDS LIST, 1996, JAN, 26.

Location : Angarsk Region, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Transportation. About 350 cum (cubic metres) of kerosene spillage from ruptured 300 mm pipeline.

Lessons

[None Reported]

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]

8492 12 January 1995

Source : LLOYDS LIST, 1995, JAN, 17.

Location : , GULF OF MEXICO

Injured : 0 Dead : 0

Abstract

Valve rupture led to spillage of 255 barrels of a mixture of gas, oil, water and sand. Spill contained.

[valve failure, offshore]

Lessons

[None Reported]

8546 09 January 1995

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 1995, JAN.

Location : Linyuang, TAIWAN

Injured : 0 Dead : 0

Abstract

A fire halted production at this 200,000 tpy MTBE (methyl tert butyl ether) facility resulting in a two week disruption of supply to the mainland.

[fire - consequence, product loss, processing]

Lessons

[None Reported]

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : Andhra Pradesh, INDIA

Injured : 0 **Dead** : 0

Abstract

A fire and subsequent explosion following a blowout destroyed a drilling rig valued at US\$ 3,000,000 (1995). Explosion was heard 10 km away, with flames 100 m in the air. Gas flow rates are estimated at 50,000,000 scfd.
[fire - consequence, excavation]

Lessons

[None Reported]

8491 08 January 1995

Source : LLOYDS LIST, 1995, JAN, 10, JAN,11, JAN, 12, JAN, 14, JAN, 17, JAN, 31.

Location : Pradesh, INDIA

Injured : 0 Dead : 0

Abstract

Blowout and fire at gas well when drilling at 2,777 metres. 10,000 people evacuated.

[fire - consequence, evacuation, exploration]

Lessons

[None Reported]

8489 03 January 1995

Source : LLOYDS LIST, 1995, JAN, 7.

Location : Shandong Province, CHINA

Injured : 57 **Dead** : 10

Abstract

Transportation. A gas blast destroyed a busy road intersection as a gas pipeline ruptured. Fatality.
[explosion]

Lessons

[None Reported]

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.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Fired heater tube failure. A heater tube failed during the start-up of a naphtha hydrotreater unit, causing damage to equipment and product loss. It was found that a liquid seal stopped flow while heater was firing and the tube failed due to ductile overload/severe overheating (blockage). The incident was caused by changes to process conditions and modifications to unit that led to the development of liquid seals.
[tube failure, design or procedure error]

Lessons

Modifications to process design conditions and equipment must be subject to technical assessment and safety review.

Fired heaters require adequate instrumentation to ensure that overheating/uneven heating of tubes does not occur, e.g., individual pass flow and temperature monitoring, skin thermocouples, etc.

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : North Sea, UK

Injured : 0 Dead : 0

Abstract

Production was halted from this 75000 bpd production platform following storm damage to safety, pipeline and fire detection equipment. Repairs to electrical equipment on the Floating Storage Unit were disrupted, due to bad weather.
[offshore, damage to equipment, weather effects, product loss]

Lessons

[None Reported]

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : Louisiana, USA

Injured : 0 **Dead** : 0

Abstract

A fire followed rupture of a heat recovery vessel, resulting in shutdown of methanol and chlorine and caustic soda units.

[fire - consequence, processing, plant shutdown]

Lessons

[None Reported]

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]

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]

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : Fos-sur-Mer, FRANCE

Injured : 0 **Dead :** 0

Abstract

A fire in the vinyl chloride monomer (VCM) furnace damaged site facilities.
[fire - consequence, damage to equipment, processing]

Lessons

[None Reported]

8551 19 December 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : Urals, RUSSIA

Injured : 0 Dead : 0

Abstract

Transportation. A gas pipeline rupture resulted in fire breaking out in an isolated forest region.

[fire - consequence]

Lessons

[None Reported]

8486 18 December 1994

Source : LLOYDS LIST, 1995, JAN,; HAZARDOUS CARGO BULLETIN, 1995, MAR.

Location : Tyumen Region, RUSSIA

Injured : 0 Dead : 0

Abstract

Transportation. Leaked oil from pipeline ignited and covered 600 sq metres of land. Power lines damaged and 43 wells closed.
[spill, damage to equipment]

Lessons

[None Reported]

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995

Location : Bavaria, GERMANY

Injured : - **Dead** : 0

Abstract

Bursting of a 10 cubic metre reaction vessel containing solvents caused damage and injury at this plant which manufactures nitrocellulose, explosives and intermediates.

[damage to equipment, rupture, processing, explosive, injury]

Lessons

[None Reported]

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : Chechnya, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Transportation. A gas pipeline burst, reducing gas supply from Azerbaijan and cutting gas supplies industry in the Chechen capital.
[rupture, damage to equipment]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1995, FEB.

Location :

Injured : 0 Dead : 0

Abstract

A gas leak from a storage tank near a subway construction site, caused a massive blaze followed damaging cars, homes over an area of an acre.
[storage tanks, fire - consequence, damage to equipment]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 **Dead :** 0

Abstract

During testing of a new polyester resin reactor, a line ruptured releasing about 50 to 100 US gallons of heat transfer oil. Four employees on site were evacuated and no one was injured. The oil did not ignite but the fire department was called as a precaution.

[reactors and reaction equipment, evacuation, spill, near miss, mechanical equipment failure]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 126, 3-6.

Location : ,

Injured : 13 Dead : 0

Abstract

A breakdown of operations occurred on plant which was caused by the bursting of an acrylic acid tank. This resulted in a large-scale fire fuelled by the escaping acrylic acid/polyacrylic acid. The polyvinyl alcohol storage facility nearby also caught fire

The following combination of events lead to the accident:

1. A power supply failure.
 2. External temperature of around 5 degrees C, with a north wind.
 3. The open-topped building.
 4. Crystallising out by the acrylic acid in both pipeline circuits.
 5. Warming-up and polymerisation caused by the pump working against a blocked delivery route.
 6. Thawing of the crystallised acrylic acid in the bypass pipeline.
 7. Transfer of polymers into the acrylic acid storage tank.
 8. Slow warming of the tank's contents by around 0.5 degrees C/hr due to the pump passing against a throttled valve,
 9. Ineffectiveness of the temperature monitoring system, since the large circulation pipeline remained blocked all the time.
- [cold weather, rupture, fire - consequence, polymerisation, chemical missing, instrumentation failure, temperature meter/control]

Lessons

The following safety procedures were introduced to avoid the reoccurrence of a similar incident:

1. A continuous independent temperature measurement of the tank contents will be provided.
2. The circulation pump will be equipped with a temperature control safety switch.
3. Safeguards put in place to ensure that temperatures in acrylic acid storage facilities and in rooms containing acrylic acid pipelines do not fall below a certain level. This will avoid crystallisation of the acrylic acid in the event of a power failure.
4. Analytical surveillance will ensure that the inhibitor concentration within the acrylic acid does not fall below 200 ppm.
5. A measuring device will be installed to monitor the throughput of the major pipework.
6. An emergency reaction inhibition system will be installed.

6771 21 November 1994

Source : LLOYDS LIST, 1994, 22 NOV.

Location : Off Galveston, USA

Injured : 0 Dead : 0

Abstract

An offshore platform was towed to 18 miles south south east of galveston and put down legs onto a pipeline causing its rupture. Other report said that anchor was dragged.

[damage to equipment]

Lessons

[None Reported]

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

A fire occurred in a carbon absorber following maintenance. Only minor damage was sustained and there were no injuries. Processing staff noticed that an isolation spade had been left in a pipeline preventing normal steaming of a newly fitted highly activated carbon bed following maintenance work. The operator noticed that system pipework was extremely hot indicating a flow of hot acetone onto the highly activated carbon even though the line isolation valve was shut. He assumed the valve was passing and filled the lute in this line to form a seal. He left the plant to cool overnight. The plant was monitored and found to be normal the next morning when the spade was removed and the plant steamed and dried prior to starting processing. Within 20 minutes a high exhaust temperature was detected and the operator activated the internal water drench system to cool the bed. The bed was cooled and the absorber opened to reveal that a fire had affected the lower part of the absorber bed. Further investigation suggested that the very short exposure of a highly activated bed to hot acetone vapour was sufficient to generate enough heat of adsorption to initiate a fire. Leaving the bed overnight to smoulder contributed to the fire.

[fire - consequence, damage to equipment, design or procedure error, high temperature]

Lessons

1. Newly charged activated carbon beds must be steamed immediately after installation.
2. Carbon should be charged to beds using water conveying. This reduces the fire risk as well as improving occupational health exposure potential.
3. Double isolation valves are preferable to a single valve and lute system.

6755 06 November 1994

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 4TH QUARTER, 1994.

Location : Alagoas, BRAZIL

Injured : 0 Dead : 5

Abstract

Explosion caused a 2 week plant shutdown of this alcohol /ethanol distillery. Fatality.
[processing]

Lessons

[None Reported]

6751 02 November 1994

Source : LOYDS LIST, 1994, 5 NOV.

Location : Karachi, PAKISTAN

Injured : 0 Dead : 0

Abstract

Crude oil pipeline ruptured, causing a spill, when workers were digging close to it and hit it with a pick axe of a digger.
[drilling/digging/ploughing vehicles]

Lessons

[None Reported]

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.

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 its 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.

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

An explosion occurred in a flaking plant in the plant cyclones. An associated fire spread to adjacent conveying equipment. The explosion was safely relieved via explosion doors and no injuries were sustained. The small fire was put out within 2 minutes without serious damage. A hot spot was detected in a mill during routine operation. The installed protective devices shut the plant down. Investigation did not highlight a problem and production was restarted. 20 minutes later a small explosion occurred in two downstream cyclone units which was safely vented. The cause of the incident was not clear. It is supposed that a wad of pulp jammed in the mill. The blockage was cleared but caused an overload trip to generate a 20 minute time-out. The heavy load of generated a hot spot in the system. Upon restarting operations, hot material was fed forward to the cyclones. Because of the shutdown period the normal reduced oxygen conditions had not been sustained and the particles burned initiating the explosion.

[fire - consequence, solids processing equipment, plant shutdown, flow restriction]

Lessons

1. Changes are required to the procedures used for clearing blockages.
 2. Review potential for dust explosions within the system and whether the protection provided is adequate.
 3. Ensure inert gas feed to system fails open on system tripping to maintain an oxygen depleted atmosphere.
-

Source : NEWSGRID

Location : Houston; Texas, USA

Injured : 0 **Dead :** 0

Abstract

Debris coming down a swollen river caused 3 breaks that spewed about 1.2 million gallon of gasoline and oil into the burning river. Probably 5 pipelines ruptured.

[spill, explosion, fire - consequence, flood]

Lessons

[None Reported]

8488 21 October 1994

Source : LLOYDS LIST, 1995, JAN, 7.

Location : Texas, USA

Injured : 0 Dead : 0

Abstract

Transportation. Pipeline ruptured during floods was restarted at end of December.

[weather effects]

Lessons

[None Reported]

6739 21 October 1994

Source : LLOYDS LIST, 1994, 22 OCT., 25 OCT, & 4 NOV.

Location : San Jancinto River; Houston; Texas, USA

Injured : 0 **Dead** : 0

Abstract

A 40 inch gasoline pipeline ruptured in morning and a 36 inch fuel oil pipeline shortly afterwards. Fire burnt out. Failure of pipeline believed to be due to flood water loosening anchor points or heavy object released by flood striking pipeline.

[spill]

Lessons

[None Reported]

Source : SEDGWICK LOSS CONTROL NEWSLETTER, 4TH QUARTER, 1994.

Location : Cedar Bayou; Texas, USA

Injured : 0 **Dead** : 0

Abstract

Texas floods caused plant shutdown at a site involving ethylene and polyethylene plants and general utilities. Flood water breached bund walls, dykes, and inundated substation, control room and offices.

[processing]

Lessons

[None Reported]

6734 19 October 1994

Source : LLOYDS LIST, 1994, 21 OCT.

Location : Bonn, GERMANY

Injured : 0 Dead : 7

Abstract

Boiler ruptured spraying men with steam at 500 degrees C when carrying out routine valve maintenance at a power station. Fatality.

Lessons

[None Reported]

Source : LOSS PREVENTION BULETIN, 129, 9.

Location : ,

Injured : 0 Dead : 0

Abstract

Heavy rains, amounting to approximately 65 cm, resulted in extensive flooding from the surface water as well as overflowing streams. Most of the water that flooded this 90-acre plant. Flood water covered the entire plant in depths ranging from 60 to 150 cm.

Plant management anticipated the flooding and was successful in shutting down all six process units in an orderly manner. Additionally, plant personnel were successful in relocating the smaller and lighter property items to higher ground. This effort notwithstanding, the flood waters caused extensive damage, mainly to computers, electrical substations, switchgear, pumps, motors and buildings. At least 350 electric motors varying in size from 5 to 20 horsepower were completely submerged and required replacement, while the larger electric motors up to 1,500 horsepower were disassembled, baked out, and repaired.

The plant was shut down for approximately two months as a result of this flooding. During this period, the ethylene, polyethylene, olefins, and acetylene black production was shut down, resulting in a business interruption loss estimated at \$85,000,000 (1994).

[damage to equipment]

Lessons

[None Reported]

6727 14 October 1994

Source : LLOYDS LIST, 1994, 8 NOV, & 19 NOV.

Location : Vung Tau, VIETNAM

Injured : 0 **Dead** : 0

Abstract

An anchor of a vessel damaged a 67 mile undersea gas pipeline. Rupture occurred between 14th and 22nd october.
[marine vessel snagged pipeline]

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]

6711 October 1994

Source : LLOYDS LIST, 1994, 25 OCT., 27 OCT., 28 OCT., 5 DEC., & 27 DEC.

Location : Usinsk Area, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Major pipeline ruptured, due to corrosion, causing a spill of crude oil over 14400 sq m area. 120 000 tonnes of oil spilt over tundra causing river pollution.

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1995, MAR.

Location : Niigata, JAPAN

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. Heavy weather damage and subsequent hull damage caused by acid cargo on chemical tanker at end of voyage, settled as constructive loss.

[weather effects, damage to equipment]

Lessons

[None Reported]

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

Location : Deer Park, USA

Injured : 0 **Dead** : 0

Abstract

Ethylene unit suffered damage to 3 furnaces after the failure of a compressor.

[mechanical equipment failure, damage to equipment, processing]

Lessons

[None Reported]

Source : SEDGWICK LOSS CONTROL NEWSLETTER, ISSUE 1, 1995.

Location : , SOUTH KOREA

Injured : 53 Dead : 3

Abstract

Loss of 25,000 tpy TDI (toluene diisocyanate) and urethane plant caused by explosion. Fatality.
[product loss, processing]

Lessons

[None Reported]

Source : THE SAFETY AND HEALTH PRACTITIONER, APRIL, 1997.

Location : Kent, UK

Injured : 7 Dead : 6

Abstract

A pedestrian walkway collapsed. The walkway had been installed four months prior to its collapse and was designed to be used by up to four million passengers a year. It led from a passenger terminal to a floating pontoon and from there to the ferry. The only part of the structure which was attached to the pontoon was the upper right hand foot which was attached by way of a stub axle and was thus a safety critical part of the design. The stub axle welds both failed as a result of fatigue cracking because the walkway and its foot assembly had not been designed to withstand the stresses to which it was exposed. Once these welds failed, the walkway section was unrestrained and simply walked off the support platform as a result of the pontoon's normal motion.

[metal fatigue, weld failure, fatality]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Catalytic reformer shut-down due to coking at a refinery.

Thermal sensitive paint alerted to hot spots in third reactor. After shut down and coke burn, all three reactors were opened for inspection, at which time the third reactor was found to have sustained considerable damage. Oxidation led to creation of hot spots, which further led to catalyst destruction, contributing towards equipment destruction.

The cause of this incident was a lack of facility for measuring catalyst bed temperatures or monitoring oxygen levels in the reactors.

[chemical causes, reactors and reaction equipment, damage to equipment, operation inadequate]

Lessons

All modifications to plant, or changes in procedures, must be subject to the formal review procedure, taking account of designers/licensers information and/or approval.

6679 28 August 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, OCT.; LLOYDS LIST, 1994, 30 AUG.

Location : Pugachev, RUSSIA

Injured : 0 Dead : 0

Abstract

A rupture of a 41 inch crude oil pipeline caused 1000 ton of oil to be sprayed into a ravine and field.

[spill]

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]

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.

6656 07 August 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, OCT.; LLOYDS LIST, 1994, 9 AUG.

Location : North Bay; Ontario, CANADA

Injured : 0 Dead : 0

Abstract

A rail transportation incident. A train hit gravel truck on level crossing. 1 of 12 rail tankers ruptured causing a spill of sulphuric acid.
[collision]

Lessons

[None Reported]

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.

Source : ENDS REPORT, 1996, JUN.

Location : , UK

Injured : 0 Dead : 0

Abstract

Gas oil mist released from a temporary pump caught fire after coming into a contact with a pipe at 300 degrees C. The damage was estimated at £750,000 (1994) and cost £2,000,000 (1994) in lost production.

[fire - consequence, damage to equipment, product loss, hot surface]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A fire occurred on an absorber tower piping. After an equipment modification, there was a severe surge created, with major vibration. Flange leaks, loss of containment, and fire followed. There was damage to equipment. It was found that the control valve was oversized which led to surge condition within piping.

The basic cause was that the management of change system did not require engineering specialist reviews for control valve changes.

[maintenance inadequate, fire - consequence, management system inadequate]

Lessons

Management of change processes should include clear requirements for the various types of equipment, and, as a minimum, should cover the following: pertinent documentation, relevant calculations, and special reviews by engineering.

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.
-

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]

Source : HAZARDOUS CARGO BULLETIN, 1994, OCT., 92.

Location : White Plains; New York, USA

Injured : 23 **Dead** : 1

Abstract

A road transportation incident. A road tanker hit an overpass bridge support. The tank containing 3.56 cum propane, ruptured, leaked and ignited. The force of the blast propelled the main part of the cargo tank over 100 metres. 10 house destroyed. Fatality.
[fire - consequence]

Lessons

[None Reported]

6636 17 July 1994

Source : SEDGWICK LOSS CONTROL NEWSLETER, 3RD QUARTER, 1994.

Location : Taipei, TAIWAN

Injured : 0 **Dead** : 0

Abstract

A fire at a thermoplastic elastomer plant resulted in plant shutdown for 3 weeks.

[fire - consequence, processing]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 3 Dead : 0

Abstract

An incident occurred during night shift on a bleach plant. The process involved production of chlorine and caustic soda by electrolysis of brine and then reaction of these products to form sodium hypochlorite solution.

A strong smell of chlorine was detected in the control room of an adjacent plant. The operator at the bleach plant was contacted and asked to investigate. No immediate problem was found but after about 50 minutes the shift manager from the adjacent plant located a release of chlorine from an absorber in the bleach plant. The shift manager recommended that the bleach plant be shut down and that an engineer be called out to investigate. He then left the bleach plant assuming that the plant would be immediately shut down.

The chlorine smell at the control room of the adjacent plant seemed to be reducing but did not disappear. A BA (breathing apparatus) set was left in the control room as a precaution. More than an hour later, the fumes became so strong that the control room operator had to wear BA and other personnel had to leave.

The shift charge engineer went to the bleach plant and, from discussion with the engineer who had been called in to investigate, learned that the plant had not been shut down. The plant was finally shut down almost two hours after the first recommendation for shut down.

Investigation showed that the cause of the release was undetected opening of a bursting disc allowing chlorine to pass through an absorber to a vent.

Release of chlorine through the bursting disc should have been detected by an installed instrument and a caustic soda flow started to the absorber to remove the chlorine.

Subsequent investigation was not clear whether the bursting disc had opened due to over pressure or due to corrosion. The bursting disc was constructed of teflon coated graphite. In the event of damage to the coating chlorine would penetrate and cause progressive deterioration of the disc.

The chlorine detector downstream of the bursting disc was saturated with water and inoperative. The chlorine detector was located in a stagnant pipe.

[chlorine gas, normal operations, gas / vapour release, plant shutdown, bursting disc failure]

Lessons

As a result of the incident investigation the immediate response to prevent a recurrence was to maintain a continuous flow of caustic soda through the absorber. This would ensure that any chlorine release through the bursting disc would be scrubbed out before the gas was vented. It was intended that this mode of operation would be used until there was confidence that chlorine would be detected. The chlorine detector was relocated and a trial of alternative detectors was initiated.

The bursting disc was to be replaced after three months and the disc removed would be sent to the manufacturer for examination to determine whether there was any deterioration.

The greatest concern from the investigation was the failure to immediately shut down the plant when the chlorine release was detected. There were a number of contributory factors to the decision by the operator and engineer not to shut down. These included: -

1. Failure of chlorine detectors indicated that there was no chlorine release from the bursting disc.
2. No local smell of chlorine or indication of leak on bleach plant.
3. Different ownership of bleach plant and adjacent plant leading to lack of clarity of responsibility and authority.

The main recommendation to address this latter problem was an instruction to the bleach plant personnel to immediately shut down the plant if chlorine was detected on the plant or on any adjacent plant.

6634 16 July 1994

Source : OIL AND GAS JOURNAL, 1994, 25 JUL.

Location : Cinizia; Gallup; New Mexico, USA

Injured : 2 **Dead** : 0

Abstract

Pressure vessel used to treat propane failed in an alkylation unit.

[vessel failure, rupture, gas / vapour release, processing]

Lessons

[None Reported]

6624 09 July 1994

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

Location : Pt Arun, INDONESIA

Injured : 0 **Dead** : 0

Abstract

Plant shutdown following a break in a pipeline leading to liquefied natural gas (LNG) plant.

[gas / vapour release]

Lessons

[None Reported]

6618 05 July 1994

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

Location : Antwerp, BELGIUM

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. An LPG marine tanker destroyed a jetty during berthing and damaged pipelines. Gas escaped but did not ignite.
[collision, damage to equipment]

Lessons

[None Reported]

6614 01 July 1994

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

Location : Mississippi River, USA

Injured : 2 **Dead** : 1

Abstract

Drilling barge spudded down and ruptured natural gas pipeline. Fatality.

Lessons

[None Reported]

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.

6606 27 June 1994

Source : LLOYDS LIST, 1994, 30 JUN.

Location : Bastian Bay; Louisiana, USA

Injured : 0 **Dead** : 0

Abstract

A natural gas pipeline rupture and caught fire.

[fire - consequence]

Lessons

[None Reported]

Source : OCCUPATIONAL SAFETY AND HEALTH OBSERVER, A COMPENDIUM OF LESSONS LEARNED, OCTOBER 1994.

Location : , USA

Injured : 0 Dead : 0

Abstract

A petroleum reserve was shut down due to an employee being found working outside a platform area over a river without using the required fall protection or personal flotation device.

The failure to use appropriate personal protective equipment represented a condition of imminent danger and violated OSHA regulations stipulated in 29 CFR 1926. 106(a) and 29 CFR 1926. 104(a).

The worker was directed to a safe location and work stopped for investigations.

The next day, all subcontractor personnel were retained on the importance and proper use of personal fall protection and flotation equipment.

Although this incident resulted in a near-miss occurrence, it could easily have ended in a serious injury or fatality.

[plant shutdown, safety procedures inadequate, near miss, personal protective equipment]

Lessons

To prevent accidents, management must do more than post signs and provide training on the use of fall protection and safety procedures. An environment that actively nurtures an awareness of safety at all personnel levels is also necessary. Such an environment will emphasize safety over production, and workers will be able to recognise and question any potentially unsafe instruction or action without fear of reprisal.

Source : LLOYDS LIST, 1994, 27 JUN.; HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, AUG.

Location : Kfar Vitkin, ISRAEL

Injured : 0 **Dead** : 0

Abstract

A rail transportation incident. Derailment of 5 rail tanker cars of methyl bromide and pesticides led to damage to equipment but no injuries or spillage.

Lessons

[None Reported]

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

Location : Grand Isle; Louisian, USA

Injured : 0 **Dead** : 0

Abstract

Fire at gas processing plant shutdown one compressor.

[fire - consequence]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A flock pulp hammer mill exploded on a Fibres Plant resulting in structural damage and business interruption. A loud bag was heard and on investigating it was found that cover plates were missing from a mill. The mill had vented through. A 30 inch square inspection door which acted as a relief device. Damage to the building sheeting resulted. Fires were triggered in the pulp dust on the floor and ledges in the plant. Significant damage was caused to electrical equipment by fire fighting water. The Site Emergency Team dealt with the incident, with assistance from adjoining Chemical Plant personnel. Damage was sustained to motors, wiring and building cladding. Material Damage is put at US\$ 300,000 (1994). The Business Interruption loss is estimated at US\$ 700,000 (1994).
[solids processing equipment, explosion, damage to equipment, fire - consequence]

Lessons

1. Improve inspection and maintenance regimes for the mills.
 2. Maintain the plant areas in a clean state, to prevent similar secondary fires escalating such an event.
 3. Consider the need for explosion suppression systems.
-

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

Location : Karwar; Karnataka, INDIA

Injured : 0 **Dead** : 0

Abstract

Incident at a nuclear power station. Concrete inner containment dome collapsed due to deviation from design drawings, work on 4 other reactors stopped.
[power plant, construction]

Lessons

[None Reported]

6549 10 May 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, AUG.

Location : Dhandi, PAKISTAN

Injured : 0 **Dead** : 0

Abstract

Collision on level crossing when express train hit a road trailer taking drilling rig to new location. Truck and rig destroyed.
[damage to equipment, transportation]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

All external electrical power supply was cut from the duplicate feeders to the refinery, resulting in an emergency shutdown of all process units. Refinery power generation continued but was rendered ineffective due to a reversal into the electricity company's distribution system. Refinery boilers shutdown occurred 15 minutes later due to low instrument air pressure, resulting from an inability to re-start the refinery electric driven air compressors. Investigation proved that all personnel involved in the incident acted correctly under the very difficult circumstances and all protective safety systems were fully effective. The shutdown of the refinery and the subsequent re-streaming operations were carried out without any incidents or adverse environmental impact.

[processing, plant shutdown]

Lessons

1. Sites need to be aware that even with two separate electrical feeders, power can still be lost from circumstances beyond their control.
 2. Ideally, limitations on reverse flow/export of power from the site into the electric company supply system should be achieved automatically to avoid "running down" the site's own electrical generating system.
 3. Alternative instrument air supplies back-up for essential users should be available.
 4. Training for operators should include not only the obvious effects of power loss, but also a study of secondary results this may produce as indicated by this incident - i.e., the power and utilities system should be subjected to a HAZOP - type study.
-

6529 01 May 1994

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

Location : Porvoo, FINLAND

Injured : 0 **Dead** : 0

Abstract

Explosion in polyethylene unit causing 1 week plant shutdown.

[processing]

Lessons

[None Reported]

Source : LLOYDS LIST, 1994, 1 JUL.

Location : Eugene Island, GULF OF MEXICO

Injured : 0 **Dead** : 0

Abstract

An exploration drilling rig sustained leg damage when attempting to go on location.
[damage to equipment]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 128, 3-5.

Location : ,

Injured : 0 Dead : 0

Abstract

A high pressure reactor ruptured during a catalyst activation operation. A gaseous stream of hydrogen and light hydrocarbons was released and spontaneously ignited. The unit was immediately shutdown and depressurised. The fire was limited to the vicinity of the ruptured reactor and was extinguished within twenty minutes by onsite emergency services. There were no injuries but damage to equipment included the reactor and some piping, instrumentation and air-fin heat exchangers on an adjacent structure.

An investigation was carried out and the causes identified. The operation in progress was a catalyst activation process which involved reducing an oxide coated form of the catalyst in the presence of hydrogen to its base metal form. The fresh catalyst to be activated was loaded in the top bed of a three bed reactor. The lower two beds of the reactor already contained previously used catalyst. In order to activate the fresh catalyst in the top bed, hydrogen had to be passed over the catalyst for a period of four hours at relatively high temperature and pressure. Target activation temperature was higher than the normal operating range of 300-380 degrees C, but within the reactor design temperature. The hydrogen used was from the site system and contained 70% hydrogen and 30% hydrocarbons in the range C1 to C5 with trace C6+. Since the reactor was a stacked bed reactor with entry at the top, the hydrogen rich gas had to pass over the fresh catalyst and then the older catalyst beds.

The gas was initially warmed-up via a furnace and passed through the reactor. As the inlet bed temperature target was approached, the furnace coil outlet temperature overshot its set point and three out of the four top bed temperature instruments went out of range, with the temperature at the bottom of that bed exceeding the vessel design temperature. In response, furnace firing was reduced and quench gas flows were increased to the reactor. Temperature control was poor as the furnace was tuned for normal process liquid/gas operation rather than gas-only activation. Two hours into the activation, the top bed temperatures had steadied out around the target activation temperature but the bottom temperature reading in that bed and all eight of the temperature readings in the two catalyst beds below remained offscale, beyond the design temperature of the reactor.

The activation step was completed two hours later and the reactor cooled down. Three hours into the cool down phase, the reactor, which had a diameter of one metre and a wall thickness of 50 mm, ruptured at the base of the middle catalyst bed.

[spontaneous combustion, fire - consequence, temperature meter/control, processing, operator error, reactors and reaction equipment]

Lessons

This was only the second time that the activation had been performed on this catalyst system. In hindsight, the actual processes occurring within the reactor were not fully understood and the job preparation could have been improved. However, the root cause of the incident was that temperature instrument readings were discounted. Safety refresher training must emphasise that instrumentation and alarms must not be discounted and, where data conflict, a defensive position should be chosen and a safe operating regime established at all times.

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.

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.

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A leak occurred at the base of a debutaniser into the skirt of the column and subsequently overflowed into the plant sump. The leak resulted in the loss of 4.5 tonnes of polymer and approximately 2.5 kg of raffinate. The plant was immediately shutdown and the butane content of the column was pumped to storage. The factory fire service was called, but was not needed. There were no injuries, but the plant was shut down for 8 days. Although attempts were made to recover the polymer from the sump, some was found in the effluent outlet, such that the consent limit of 30 ppm oil would have been exceeded. The investigation into the incident showed that:

1. The site of the leak was a corroded 2 inch NB nozzle at the base of the column. The nozzle was a dead leg with no flow.
2. The corrosion was probably the result of condensate lying in the nozzle for 3-4 month periods between plant wash out.
3. Severe thinning had occurred at the interface between the polymer and the condensate.
4. A failure had occurred on a dead leg nozzle on a reboiler recirculation pump some months earlier. However, this nozzle had not been recognised as being vulnerable to the same type of failure.

[normal operations, plant shutdown]

Lessons

In addition to various repairs, inspections and stress calculations on the column, the following actions were taken:

1. The corrosion mechanism was to be investigated by the Company Metallurgist.
 2. The Plant Wash operating instructions were to be updated to cover the draining of dead legs to show they are free of condensate.
 3. When a scheme of examination is set up for a plant item, previous inspection reports should first be reviewed.
 4. The drainage route for the plant effluent should be reviewed.
 5. Some alterations to the Emergency Response Procedures were recommended for further consideration.
-

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]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An explosion occurred in a waste incinerator, used to dispose of waste from acrylic and viscose plants. Damage was sustained by the incinerator and associated equipment. Immediately prior to the incident, fourteen drums, originating from a viscose making plant, had been discharged into the furnace. The explosion followed a couple of minutes later.

Although the precise circumstances of the explosion are not clear, it was considered that molten salt residues within the incinerator were involved and that the explosion was due to the rapid evaporation of water. Salts (sodium sulphate and sodium hydroxide), entering the incinerator with waste would form a molten pool in the kiln section.

[damage to equipment, normal operations]

Lessons

A number of recommendations were made. These included:

1. The kiln to be operated in such a way that molten salt pool formation is minimised.
 2. A number of routine jobs are carried out in the vicinity of the kiln. These are to be minimised and access to the area should be prohibited if the presence of a molten salt pool is present (and for a period of time after charging waste to the incinerator).
-

Source : ICHEME

Location : , GERMANY

Injured : 0 Dead : 0

Abstract

A series of three explosion occurred within a few seconds in the waste incinerator of a chemical site during a night shift. There were no injuries and the damage sustained was slight. The incinerator burns waste from acrylics and viscose plants. The incinerator was operated for 20 years without any significant incidents. Salts (sodium sulphate and sodium hydroxide) were being charged and collecting as a molten pool in the rotary kiln section. A quantity of this residue had been allowed to build up. The explosion occurred within 2 minutes of a 14 drum charge being made to the system. On-site inspections suggested the damage caused was greater than that consistent with mild over-pressure but there had been no equipment failure. A Rapid Phase Transformation (or Physical explosion) caused by very hot molten salt entering the quench bath (containing water) from the kiln was seen as the most likely cause. This might have been triggered by a small transient over-pressurisation.

[charging, processing, overpressurisation, damage to equipment, accidental mixing]

Lessons

1. Inventories of molten salt to be minimised within the incinerator. The best means of achieving this is not to change salts containing metal ions to the system.
 2. A programme of regular inspections of the kiln should be instigated to ensure that residues are not allowed to build up.
 3. Restrict access to the area at the bottom of the kiln, especially during and after charging.
-

Source : OIL AND GAS JOURNAL, 1994, MAY.

Location : Mont Belvieu; Texas, USA

Injured : 2 **Dead** : 0

Abstract

Explosion and fire at natural gas liquids (NGL) fractionating plant. Damage limited to pipe, electrical and process control systems.
[separation equipment, fire - consequence, plant shutdown]

Lessons

[None Reported]

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

Location : Saratov, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Explosion ruptured a natural gas pipeline fire followed.

[fire - consequence]

Lessons

[None Reported]

6512 16 April 1994

Source : LLOYDS LIST, 1994, 18 APR.

Location : Cork Harbour, IRELAND

Injured : 0 **Dead** : 0

Abstract

Natural gas pipeline damaged by vessel which dragged pipeline 25 m across the seabed. Possibly caused by an anchor.
[marine vessel snagged pipeline, damage to equipment]

Lessons

[None Reported]

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

Location : Pasirguandang; Johur Baru, MALAYSIA

Injured : 0 **Dead** : 0

Abstract

Fire damaged a furnace and caused this ethylene plant shutdown.

[fire - consequence, processing]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A leak occurred on a main fractionator column of the CDU at a refinery resulted in a fire and shutdown of the unit. No injuries resulted from the incident and damage to the column was relatively minor. There was damage to access ladders and sections of grating, to a one inch service air line, and instrumentation cabling and lighting which was in the flame impingement path was destroyed.

The release of hydrocarbon vapours from the column was most likely caused by the relaxation of flange bolts on a 6 inch blanked nozzle. Relaxation of the bolts was not caused by any unusual action of the operators, but was probably due to thermal stresses created during shutdown and start-up of the unit, though a contributory factor could have been the introduction, in an uneven flow, of significant volumes of cool oil from the bottom pump-around circuit.

Autoignition of the vapours is considered as most likely.

Response to the incident was efficient, both the refinery and Central Regional Fire brigades responded rapidly to the emergency calls.

Initial fire fighting was hampered by the fact that the available fire monitors had difficulty reaching to the height of the fire source. However, additional monitors were brought from the nearby Alkylation Unit, and with these and better positioning it became possible to direct water at the fire area.

The local fire brigade was able to get additional water coverage by use of a hose from the elevated fin-fan air coolers deck.

[fire - consequence, damage to equipment, mechanical equipment failure]

Lessons

The incident 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 to be the subject of regular review to en-sure that thermal shocks to equipment are minimised 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 to 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.

Source : LLOYDS LIST, 1994, 16 APR., & 18 APR.

Location : Amazon Jungle, PERU

Injured : 0 **Dead :** 0

Abstract

A spill of 3500 cum of crude oil occurred from a 24 inch pipeline. Cause of rupture was turbulent waters in the river that eroded earth around the pipeline.
[earth movement]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

An electrical fault in a substation resulted in a complete power failure to the plant, and some collateral damage to a starter column as a result of arcing. The resultant power loss also affected an adjacent research department, causing the shut down of two pilot plants. All affected plants failed to a safe condition following loss of power.

Investigation of the incident found that there had been ingress of rainwater into the electrical equipment in the starter column 1. leading to arcing between the busbar droppers, which then developed a three phase to earth fault. The ingress of water was due to a defective substation roof (reported to have been caused 'by normal wear and tear').

[electrical equipment failure, power supply failure, plant shutdown, electrical]

Lessons

[None Reported]

6453 06 March 1994

Source : LLOYDS LIST, 1994, 1 APR.

Location : Ufa; Bashkortostan, RUSSIA

Injured : 0 **Dead** : 0

Abstract

Oil spilled from a ruptured pipeline and filled nearby depressions and gullies before overflowing into a river.

Lessons

[None Reported]

6449 05 March 1994

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

Location : Convent; Louisiana, USA

Injured : 0 **Dead** : 0

Abstract

Fire within the residual upgrading unit. Both trains shutdown for one week.

[plant shutdown, fire - consequence, processing]

Lessons

[None Reported]

6441 28 February 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, MAY.; LOYDS LIST, 1994, 2 MAR.

Location : Novara, ITALY

Injured : 0 Dead : 0

Abstract

Oil well blowout sprayed oil, gas and water for 3 days.

[spill]

Lessons

[None Reported]

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

Location : Pierrelatte, FRANCE

Injured : 0 **Dead** : 0

Abstract

Due to high levels of radioactivity close to this facility, the unit was shutdown by the local authorities.

[radioactive release, plant shutdown]

Lessons

[None Reported]

6423 15 February 1994

Source : LLOYDS LIST, 1994, 19 FEB.

Location : Maple Creek; Saskatchewan, CANADA

Injured : 0 Dead : 0

Abstract

Rupture of natural gas pipeline system caused a huge fireball.

[fire - consequence]

Lessons

[None Reported]

6419 13 February 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, APR.

Location : Sukai Off, JAPAN

Injured : 0 Dead : 0

Abstract

A marine transportation incident. Collision between inbound vessel and marine tanker with 499 tonnes of ethyl acetate. No spillage.
[damage to equipment]

Lessons

[None Reported]

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.
-

6415 08 February 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, MAY. 5-94

Location : Suez Canal, EGYPT

Injured : 0 Dead : 0

Abstract

A marine transportation incident. A marine tanker grounded after collision with ferry. 3000 tonnes of liquid cargo transferred.
[damage to equipment]

Lessons

[None Reported]

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.

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A section of utility piping failed in a new distillate desulfurization unit at a refinery. The failure was as the result of internal overpressure generated from water freezing in a dead leg section of piping.

There was a release of hot product from the stripper section of the hydrotreater. The resulting vapour cloud ignited, and fire damage to nearby equipment released additional hydrocarbon.

The fire was brought under control in approximately one hour, and it was extinguished in 2 hours.

There were no injuries to personnel. Although the unit was quickly isolated, there was extensive damage to pumps, several air coolers, analysers, instrumentation, electrical conduits, and process piping. Direct damage to the unit was \$5.9 million (1994), and the unit was down for 52 days.

The dead leg piping was a result of improper piping design and inexact project execution.

[overpressurisation, cold weather, mechanical equipment failure, vapour cloud explosion, gas / vapour release, damage to equipment, design or procedure error, fire - consequence, processing]

Lessons

1. Ensure that design teams identify expertise needed at an early stage; e.g., cold weather design experience was needed.
 2. Resolve HAZOP issues, not items, making sure that the group which resolves actions communicates back to the HAZOP team, to ensure that true concerns are adequately addressed.
 3. The Pre-Startup Safety Review (PSSR) should not only verify installation detail but that systems will function as intended. Piping configurations and other construction detail can sometimes cause systems to work poorly, or not as designed.
 4. Ensure that new plant has an adequate provision of fire protection, both in terms of equipment and emergency response.
-

6386 18 January 1994

Source : LLOYDS LIST, 1994, 11 FEB.

Location : Cushing; Oklahoma, USA

Injured : 0 Dead : 0

Abstract

The support rigging of a crude oil pipeline collapsed allowing the pipeline to crash into river bank bending the structure. The pipeline was undergoing maintenance at the time to replace anchoring apparatus connecting the lines support towers to a suspension bridge which traverses the river. Repair to take 14 days. No spillage reported.
[damage to equipment]

Lessons

[None Reported]

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

Location : Heilongjiang, CHINA

Injured : 0 **Dead** : 0

Abstract

Blowout during drilling. Substance involved methane.

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

An explosion occurred in the receiving bin beneath a grinding mill, which was processing triacetate. It was safely vented via the explosion vent without damage to the plant. There was no subsequent fire.

It was known that the presence of tramp metal in the grinding mill was a source of ignition. Precautions were taken to prevent metal entering the mill. There was a metal detector above the rotary valve that fed material to the mill and this operated a diverter below the rotary valve. There is also a magnet at the inlet to the mill.

[solids processing equipment, triacetate, contamination, product loss, damage to equipment]

Lessons

The investigation showed the presence of tramp metal on the magnet and damage to the grinding mill blades. There was also damage to the rotary valve but this did not appear recent.

It was concluded that metal had either not been detected or that the diverter had failed to operate correctly allowing metal to pass to the mill. Further investigation showed that the detector and diverter were fully functional. It is believed that the problem occurred due to slow rotation of the rotary valve allowing the diverter to open and close again before the metal reached it. The arrangement of the metal detector above the rotary valve was unusual and a modification had been proposed to relocate it below the rotary valve. In addition the rotary valve had been slowed down after a previous incident and the potential problem of slower rotation had not been recognised.

It was recommended that the configuration of the rotary valve and metal detector should be changed and that the rotary valve speed be restored to its original value.

As this was the second incident in a short time, it was recommended that tests should be undertaken to determine whether any properties of the triacetate had changed.

8435 1994

Source : CHEMICAL HAZARDS IN INDUSTRY, 1995, FEB.

Location : Louisiana, USA

Injured : 1 **Dead** : 1

Abstract

A production vessel in the hydrochloric acid plant ruptured in a TDI (toluene diisocyanate) process. Fatality.

[processing]

Lessons

[None Reported]

124091994

Source : ICHEME

Location : ,

Injured : 2 Dead : 0

Abstract

A fire occurred on one of the charge pumps of the debutaniser section of a hydrocracker unit, resulting in severe damage to pumps, heat exchanger, air coolers, surrounding pipework, steel structure and the debutaniser column.

The cause of the fire was attributed to failure of the screwed drain connection of the pump casing.

Fortunately, there were no severe casualties, and only two minor injuries occurred during the fire-fighting operation. Repairs took six months to complete and cost approximately USD 7.5 million (1994).

The cause:

It was found that, in addition to the blown-out pump drain, some process lines had ruptured and a number of flanges had failed. However, since these lines and flanges showed no signs of significant corrosion, it was concluded that their failure was due to the heat of the fire.

[fire - consequence, damage to equipment, material of construction failure, flange failure, hot surface, injury]

Lessons

[None Reported]

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.

6355 25 December 1993

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, MAR.; LLOYDS LIST, 1994, 14 JAN.

Location : Oxnard; California, USA

Injured : 0 **Dead** : 0

Abstract

An 8 inch underground pipeline ruptured, due to corrosion, causing a spill of 84000 gallons of crude oil.

Lessons

[None Reported]
