

1314926 November 2000

Source : BBC NEWS, 26 NOVEMBER, 2000, (<http://www.bbc.co.uk>).

Location : Cornwall, UK

Injured : 0 Dead : 0

Abstract

A marine transportation incident. A cargo ship containing more than 40,000 tonnes of metal ores, 370 tonnes of diesel and a quantity of other fuels suffered steering problems in strong winds. The cargo ship became disabled off the coast of Cornwall raising fears of pollution. Fortunately the ship managed to gain power and was escorted to safety.
[bauxite, magnesium ore, diesel oil, fuel oil, steering failure, near miss]

Lessons

[None Reported]

Source : CNN.COM, U.S. NEWS, JUNE 29, 30, JULY 4, 2000, (<http://www.cnn.com>).

Location : Richland, Washington, USA

Injured : - Dead : 1

Abstract

Thousands of residents were evacuated due to wildfires spreading across a nuclear reservation area. The fire doubled in size in just a few hours. The fire was started by a fatal car crash.

The fire came within 1,000 feet of the reactor and within half a mile of buried high-level radioactive and chemical waste.

It was feared that radioactive soil could burn and release contaminated particles into the air.

A highway and chemical retardant dropped from the air stopped the fire's advance about a quarter-mile from some uranium waste barrels stored in a field.

[natural disaster, road incidents, evacuation, fatality, near miss]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN 154, 26.

Location : Scotland, UK

Injured : 0 **Dead** : 0

Abstract

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

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, MAY 31, 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 : 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 SAFETY AND HAZARD INVESTIGATION BOARD, 18 APRIL, 2000, (<http://www.chemsafety.gov>),

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Location : Fayette County, USA

Injured : 0 **Dead :** 0

Abstract

A road transportation incident. A road tanker carrying liquid propane overturned on a highway when it was involved in a collision with another vehicle. An unknown amount of propane leaked from the tanker as a result.

Nearby residents were evacuated as a precaution.

[spill, evacuation, near miss]

Lessons

[None Reported]

Source : BBC NEWS, 5 APRIL, 2000, (www.bbc.co.uk); CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 5 APRIL, 2000, (<http://www.chemsafety.gov>),

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Location : Lillestroem, NORWAY

Injured : 0 **Dead :** 0

Abstract

A rail transportation incident. Two freight trains collided when it is thought that one of the trains brakes failed. Two cars of one of the trains contained approximately 90 tonnes of propane gas. The surrounding area was evacuated as a precaution due to a fire that broke out which threatened the cargo of propane.

Firemen used a remote-controlled water cannon to pump thousands of water per minute onto the tank cars to cool them without dousing the flames.

[near miss, collision, brakes faulty, evacuation, fire - consequence]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 30 MARCH, 2000, (<http://www.chemsafety.gov>).

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Location : Choudrant, Los Angeles, USA

Injured : 0 **Dead :** 0

Abstract

A road transportation incident. A chemical tanker containing 21 tonnes of isobutyronitrile was involved in a collision between two other trucks. The chemical tanker subsequently overturned.

Nearby residents were evacuated and both sides of the highway were closed as a precaution due to isobutyronitrile being an extremely hazardous material.

Fortunately no leak occurred and no one was seriously injured in the incident.

Isobutyronitrile is a gasoline additive that also is used to make pesticides and other chemicals.

Isobutyronitrile can get in to the body through the eyes or skin, by being inhaled or swallowed.

The report stated that trying mouth-to-mouth resuscitation could poison the would-be rescuer.

[evacuation, near miss]

Lessons

[None Reported]

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 29 MARCH, 2000, (<http://www.chemsafety.gov>).

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Location : Deer Park, Texas, USA

Injured : 0 **Dead :** 0

Abstract

A tank containing 80,000 gallons of crude acrylic acid began overheating at a chemical plant forcing the evacuation of several other chemical plants in the surrounding area. The evacuation was forced as a precaution due to the dimer reaction raising a threat of an explosion.

Minimal amount of acrylic acid was released through the tank venting process, which was dissipated by water spray used for cooling the tanks.

The 250,000-gallon tank was sprayed with water in an attempt to cool it down.

Acrylic acid is a flammable liquid that can cause irritation to skin, eyes and throat and is used in numerous products ranging from paint to diapers.

The report stated that the incident did not have any potential to harm neighbouring plants or community.

[near miss]

Lessons

[None Reported]

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

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Location : , USA

Injured : 0 **Dead :** 0

Abstract

A road transportation incident. A tractor-trailer carrying hazardous materials turned over. Fortunately none of the 1,200 gallons of sodium hydroxide leaked, no one was injured and no one evacuated.

The accident occurred when the driver of the truck attempted to break, the break lines froze so the driver pulled off the road's shoulder but lost control of the vehicle.

Sodium hydroxide (caustic soda), is used for water treatment operations and is highly corrosive.

[near miss, loss of control]

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]

122302000

Source : THE ENGINEER, 27 OCTOBER 2000.

Location : , UK

Injured : 0 Dead : 0

Abstract

A marine transport incident. Twelve nuclear submarines were taken out of service as a precaution when cracks were found in the reactor cooler system of one submarine.

Checks are being carried out to determine whether this incident could occur on the other eleven submarines.

[reactors and reaction equipment, near miss, radioactive, marine transportation]

Lessons

[None Reported]

Source : BBC NEWS, 24 DECEMBER, 1999, (<http://www.bbc.co.uk>).

Location : Wales, UK

Injured : 0 Dead : 0

Abstract

A marine transportation incident. An empty oil tanker ran aground on a beach in gale force winds. The 992 tonne oil tanker lost her anchor during force six gales, heavy sea and pouring rain. Fortunately the tanker was pulled off the beach a successfully re-floated.

[marine tanker, ship ran aground, weather effects, near miss]

Lessons

[None Reported]

12110December 1999

Source : BBC NEWS, 2 DECEMBER, 1999, (<http://www.bbc.co.uk>).

Location : Chernobyl, UKRAIN

Injured : 0 **Dead** : 0

Abstract

A nuclear power station was closed down due to a leaking pipe only days after it was re-started following five months of repair.

Officials stated that there had been no release of radioactive material and that the pipe affected the cooling system rather than the reactor itself.

[power plant, near miss]

Lessons

[None Reported]

1195110 October 1999

Source : THE SUN, OCTOBER 11, 1999.

Location : , UK

Injured : 0 Dead : 0

Abstract

A leak of hazardous chemicals occurred in an airport cargo area when a package fell from a baggage trailer. Fire crews were put on stand-by whilst the package which had just been unloaded, was examined.

An area of half a mile from the main runway and terminal was sealed off.

The substance was found to be a low-grade hazardous chemical.

[leak, spill, unloading, near miss, container, chemicals unknown]

Lessons

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]

Source : HAZARDOUS CARGO BULLETIN, NOVEMBER 1999.

Location : Evansville, Indiana, USA

Injured : 0 **Dead** : 0

Abstract

A rail transportation incident. Eleven cars of a freight train derailed causing one car containing phosphoric acid to overturn. No leak occurred. The tank car was later lifted onto the flat.

[derailment, near miss]

Lessons

[None Reported]

1175524 July 1999

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

Location : Palm Springs, USA

Injured : 0 Dead : 0

Abstract

A rail transportation incident. Eleven cars of a train derailed onto their sides forcing the evacuation of the area.

The train carrying 122 cars, including one containing chromium trioxide, a highly combustible substance when mixed with water and toxic if inhaled.

Fortunately, the car remained on the tracks.

No one was injured. The cause is under investigation.

[derailment - consequence, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 1 Dead : 0

Abstract

An electrician working on a live electrode in a desalter of a distillation unit received an electric shock. Fortunately the electrician was not electrocuted due to his hand being in contact with the equipment, which was earthed when the tool that he was holding touched the live cable.

A small fire developed as the wrench was removed causing an electric arc that immediately ignited residual oil in the sleeve space; fortunately the fire service had been called and was on the scene at the time of the fire. The fire was quickly extinguished.

The electrician suffered severe burns to parts of his hand.

The incident occurred due to working on a live transformer electrode, which was mistaken for another one that had been isolated.

[near miss, fire - consequence, design or procedure error, maintenance, electrical, injury]

Lessons

The following lessons were learned:

1. Visible and durable labels to be attached to electrical and other equipment for easy identification and to minimise human error.
 2. Work on electrical apparatus must not start without checking that the power has been isolated and the equipment checked to ensure it is safe.
-

1100826 May 1999

Source : CHEMICAL WEEK, JUNE 2, 1999.

Location : Texas, USA

Injured : 0 **Dead :** 0

Abstract

A four hour electrical outage halted production at a plant which includes a 427,000-bbl/day refinery and adjacent chemical operations such as ethylene and polyolefins.

The power loss forced flaring at the refinery and some chemical units, there were no fires or measurable toxic emissions. There were no reported injuries. An investigation into the outage is being carried out.

[electrical equipment failure, near miss, refining]

Lessons

[None Reported]

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

Location : Illinois, USA

Injured : 3 Dead : 0

Abstract

A rail transportation incident. A train hauling auto parts collided with a freight train at an intersection, flinging boxcars off the tracks. Fortunately the crew on the trains suffered only minor injuries.

Police began to evacuate the nearby town but stopped after it was determined that no hazardous materials had been spilled and that there was no danger of an explosion from spilled diesel.

However, there was concern that fuel spilled into the nearby creek would reach the nearby river, a source of drinking water for 80,000 people in the area.

A supply of sand was used to dam the creek and contain the spilled oil.

Apparently both trains were moving considerably slower than the 50 miles per hour limit allowed at the intersection at the time of the incident. Investigations are under way as to the cause of the incident.

[collision, derailment - consequence, evacuation, near miss, injury]

Lessons

[None Reported]

1052219 March 1999

Source : YAHOO NEWS, MAR 20, 1999, (<http://www.yahoo.co.uk>).

Location : Offshore, SCOTLAND

Injured : 0 Dead : 0

Abstract

A marine transportation incident. A marine tanker carrying flammable chemical fluids caught fire off the northern coast of Scotland, rousing fears of an ecological disaster.

Some 200 residents of two tiny villages were evacuated as the vessel caught fire and drifted just off the rocky coastline.

The tanker was carrying 1,750 tonnes of potentially explosive vinyl acetate which is used in the manufacturing of paints and adhesives, 76 tonnes of bunker fuel and 20 tonnes of fuel oil.

The engine room was sealed and power shut down when the fire was first reported, causing the 102 metre vessel to drift in high winds and stormy seas before being stopped by its anchor less than half a mile from the coastline. The ships captain stayed on board for three more hours, whilst the rest of the crew were airlifted to safety, to set up tow lines, drop anchor and flood the compartment separating the fire from the explosive cargo.

The vessel was eventually towed to a safe haven and the fire was successfully put out.

[evacuation, fire - consequence, near miss]

Lessons

[None Reported]

Source : CHEMICAL WEEK, JANUARY 13, 1999.

Location : , USA

Injured : 0 Dead : 0

Abstract

A small fire broke out in the finishing area of a polyethylene plant. The fire was extinguished by the in plant emergency response team, the plant was returned to normal service within 12 hours. No injuries or chemical released were reported. The cause of the fire is being investigated.
[fire - consequence, processing, near miss]

Lessons

[None Reported]

Source : YAHOO NEWS, ASSOCIATED PRESS, (<http://www.yahoo.com>).

Location : , USA

Injured : 0 Dead : 0

Abstract

Bomb incident leads to evacuation. Workers loading a bomb from a B-52 accidentally dropped the 500 pound explosive on a runway, prompting the evacuation of more than 700 nearby homes.

The bomb did not explode, however the bomb was transported to a remote bomb range where it was placed 15 feet deep, covered with dirt and detonated.
[human causes, near miss]

Lessons

[None Reported]

10243September 1998

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

Location : , SPAIN

Injured : 50 Dead : 0

Abstract

Fifty people were injured when gas explosion occurred wrecking a café. Nearly 200 people were crowded into the café, when a propane gas tank exploded bringing down the roof and walls. Shards of glass and pieces of concrete were blown across the room, fortunately there were no fatalities. It is not clear what caused the gas tank to explode.

[near miss, injury]

Lessons

[None Reported]

10399 July 1998

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

Location : Lake Issyk-kul, KYRGYZSTAN

Injured : 0 **Dead** : 0

Abstract

A road transportation incident. Several litres of nitric acid leaked from a tanker when travelling towards a nearby lake. Nitric acid is easily soluble in water and the amount is fairly small, so environmental damage is unlikely.

[near miss, spill]

Lessons

[None Reported]

123491998

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An offshore incident. A large volume of natural gas was released on an offshore gas platform. The release occurred from a leak in a pipework joint, which had been isolated for maintenance work. No one was injured in the incident.

Fortunately no fire or explosion occurred from the incident.

The company was fined £300,000 (2000).

[near miss, gas / vapour release]

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

Location : , CANADA

Injured : 0 Dead : 0

Abstract

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

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

Approximately 1000 litres of intermediate containing xylene was spilt when an operator failed to check a connection from a pump. The spillage was contained and covered with foam. There were no environmental consequences.

[operator error, spill, near miss]

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 meet the companies recommendations for burner to tube spacing in a new installation, it was determined to be an acceptable safe operation if tube skin temperatures were monitored and kept under 925 degrees F (496.1 degrees C).

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

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

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

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

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

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

Lessons

The following recommendations were made:

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

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

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

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

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

The failure of a tank discharge pump caused a tank containing acetic acid and anhydride, to overflow into its bund. The standby pump was started. However a leaking flange required the level in the bund to be controlled by pumping out into road tankers, and to discharge approx 40 to 50 tonnes to trade effluent. This was contained at the water works, with no resultant spillage to the local river.

[pump failure, near miss]

Lessons

[None Reported]

1197517 January 1997

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

An exotherm occurred on a plant after re-start. No fire occurred and no release of halon. The process was immediately shutdown for inspection and repair.
[near miss, processing]

Lessons

[None Reported]

Source : ICHEME

Location : , GERMANY

Injured : 0 **Dead :** 0

Abstract

Part of an upper tray in a column on a distillation plant became displaced releasing approximately 18 tonnes of a mix of acrylonitrile and process water. Prompt action by site personnel minimised the danger to the plant and personnel. The local fire brigade pumped the spilt liquors into another tank for refeeding back into the distillation plant at a later time.

[spill, near miss, mechanical equipment failure]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An oil storage tank was being prepared for maintenance. This involved the disconnection of electrical power supply cable to two tank-side valves and two manifold valves. A procedure was in place detailing the isolations required for the work to be done. The isolations had been listed correctly on the Isolation Confirmation Certificate (ICC) by the permit supervisor. Over the weekend, the shift supervisor had decided that isolations were not required on the two tank-side valves at this stage, and he scored them off. He asked the electrician to isolate only the manifold valves. This decision was communicated clearly to the permit supervisor. The permit supervisor saw that the ICC had been signed up as complete and assumed that the isolations had been done as he had originally requested. The electrician was given an authorisation sheet to disconnect all four valves. He disconnected the manifold valves first and then went to the tank-side valves. 110v and 415v power supplies feed the actuator. He checked the 100v supply first with his "lamp" voltage tester, but failed to see the lamp illuminated. The most likely explanation was that bright sunlight had obscured the light on the tester. He started to disconnect the 110v cables and felt a slight tingling sensation on the back of his hand. He checked the 415v supplies and found them "live." He immediately stopped work, and the work site was made safe. The electrician did not seek medical attention immediately as he considered the contact to be insignificant.

[storage tanks, near miss, design or procedure error]

Lessons

After the incident, team leaders and electrical supervisors were instructed to make their teams aware of the incident and its key lessons which are as follows:

1. Procedures are there to be followed.
 2. Equipment status should be clearly stated at hand-over and checked by the Performing Authority.
 3. Warning lights and lamps may not be visible with bright background lighting.
 4. Always seek medical attention if in contact with live electrical equipment.
-

Source : CHEMICAL HAZARDS IN INDUSTRY, 1997, AUG.

Location : , USA

Injured : 0 **Dead :** 0

Abstract

An explosion occurred at a coating factory. The explosion occurred in the duct system of a scrubber which destroys volatile organic compounds (VOCs). No injuries were reported and no hazardous substances were released to the environment.

[near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

During the start-up of an anhydride unit a flange leak occurred resulting in the loss of approximately 5 tonnes of a mixture of acetic acid, acetic anhydride and smaller quantities of benzene. The leak spilt into a dirty drain and was contained on site by being diverted to a containment pit. An incident response team was on standby throughout.

[flange failure, spill, near miss]

Lessons

[None Reported]

Source : NATIONAL TRANSPORTATION SAFETY BOARD, 1999, (<http://www.nts.gov>),; LOSS PREVENTION BULLETIN 155, 16-17.

Location : Murfreesboro, Tennessee, USA

Injured : 0 **Dead** : 0

Abstract

An incident occurred whilst preparing for maintenance on an 8-inch pipeline containing diesel fuel. The incident occurred during isolation and purging when approximately 84,700 gallons of diesel fuel was released due to overpressure rupture. The line section containing the leak was isolated. Fortunately the incident did not cause a fire or explosion and no one was injured.

[overpressurisation, operator error, spill, near miss, preparation for maintenance, operation inadequate]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

While radiography of furnaces was taking place on a petrochemical plant a workshop technician discovered that he and a colleague had been working in the exclusion area inadvertently. He alerted his colleague and both then left the area. Personnel did not suffer exposure because of where they were in the exclusion area and the size of the source in use. The exclusion area had deliberately been made large to encompass all the required test sites in a single zone. The sweep for personnel that had been carried out failed to locate the technicians in question.

The zone had been set up in the knowledge of HSE requirements to minimise the size of such areas. This was blamed on the large amount of planned radiography work during a shutdown.

The enquiry recommended:-

1. A review of procedures associated with issuing radiography work permits.
2. Additional training in radiography work procedures for the shutdown teams.

It also recommended considering:-

1. The use of higher level sources to reduce the exposure period.
2. Improved communication between the personnel responsible for radiological protection and those controlling the issue of permits.

[radioactive, testing, design or procedure error, near miss, training inadequate]

Lessons

The investigation concluded that the exclusion zone selected had been too large to control effectively. This was attributed to pressure of work. It also identified weaknesses in allocation of responsibility for sweeping the area and controlling the perimeter.

Source : LOSS CONTROL NEWSLETTER, ISSUE 2, 1996.

Location : New Jersey, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred which was limited to one tank at a depot containing 3-4 m gals of gasoline.

[fire - consequence, near miss, storage tanks]

Lessons

[None Reported]

1000012 May 1996

Source : LOSS CONTROL NEWS LETTER, 2/96.

Location : Yerevan, ARMENIA

Injured : 1 **Dead** : 1

Abstract

A plant, located near the centre of the Armenian capital, had been re-opened after public pressure to close in 1988. The explosion was reported not to have resulted in harmful emissions from this chloroprene rubber unit.

[near miss, processing, fatality, gas / vapour release]

Lessons

[None Reported]

10409 May 1996

Source : LOSS PREVENTION BULLETIN, 139, 23-24.; HEALTH, SAFETY AND ENVIRONMENT BULLETIN, 264, DECEMBER 1997.; HEALTH AND SAFETY AT WORK, DECEMBER 1997.

Location : , UK

Injured : 2 **Dead** : 0

Abstract

A loosely-bound bundle of fifty scaffold tubes was being lifted from an adjacent street, over a building under construction and lowered onto scaffolding. Although a two sling chain was suspended by simply wrapping the chain once around the bundle. As the bundle was lowered, it caught on a scaffolding upstand, the chain slackened and the tubes fell into the street below. Two members of the public were slightly hurt when the taxi they were in was pierced by the falling poles.

[scaffolding, near miss, design or procedure error]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

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

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

[near miss, faulty instructions]

Lessons

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

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Infringement of work permit system. During a shut-down of the high pressure hydrogenation unit to change-out catalyst, checking of and maintenance on valves in the high pressure loops was to be carried out as well. When work on the first valve had just begun, the operating authority, who happened to be passing by, stopped the work. Pressurised airline masks had been specified for removal of the valve bonnets, but the contractor supervisor had not communicated this to his crew. In addition the contractor supervisor had not posted a work permit at the work site, which was required by the permit-to-work system.

[permit to work system inadequate, near miss]

Lessons

Specifications for use of airline breathing masks when breaking lines must be complied with in order to provide protection to the individuals doing the work.

124291996

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An lifting incident occurred on a construction site.

The incident occurred when part of a boiler was being lifted from the horizontal to the vertical position using two cranes.

One of the two tail end lifting lugs broke, and the resultant increased load on the second lug caused this to fail as well. The lower end of the boiler element hit the ground but the load was held vertically by the main crane, thus reducing the consequences of this serious incident.

[lifting equipment, mechanical equipment failure, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Near miss during work on live foul gas system. Contractors were in the process of removing a valve from a live, foul gas system in the high pressure lube oil hydrogenation unit when they were stopped by a senior foreman who happened to be passing by. Foul gas containing more than 1000 ppm of hydrogen sulphide would have been released had the valve been fully removed.

It was found that the contractors' supervisor had mistaken the foul gas for the plant steam system.

[maintenance, contractor error]

Lessons

Work on plants which are only partially shut down and isolated can present potentially hazardous situations for maintenance crews; therefore, equipment/pipe work releases need to be done with great care. Work lists and permits, with precise permit conditions and equipment locations, must be adhered to.

Source : ENDS REPORT 263, 1996, DEC.

Location : North Yorkshire, UK

Injured : 0 **Dead** : 0

Abstract

A road transportation incident. A road tanker delivered 7 tonnes of 96% sulphuric acid which was unloaded into a tank of dioctyl phthalate. No violent reaction occurred but clean up operations were difficult.

[unloading, near miss, design or procedure error]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

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

Lessons

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

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

Abstract

Natural gas pipeline system overpressure. A pilot diaphragm in a metering station supplying the plant with natural gas failed. Due to several other compounding issues, the pilot failure caused the stand-by let-down station to go wide open, and resulted in a serious overpressure of the plant's natural gas distribution system. The incident was caused by failure of a diaphragm on the second stage PCV pilot which sent natural gas to the pilot vent line; the pressure equalising across the diaphragm simulated a low sensing pressure and caused the second stage PCV to go wide open, creating overpressure in system. There was no regularly scheduled programme of servicing and testing on meter station valves and instrumentation. Servicing was sporadic and minimal. The pilot diaphragms were not replaced according to manufacturer's recommendations, based on minimum expected life. Near miss.

[overpressurisation, operation inadequate]

Lessons

For utility supplies entering petrochemical plants:

1. Don't assume that they are adequately protected. Analyse the risks and assess the safeguards associated with these interfaces.
 2. Ensure there is ongoing maintenance of equipment and instrumentation whose reliability impacts on your plant.
-

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

During discharge of solid flake from a bulk tanker, sparks were observed on the outside of the discharge flexible hose. The discharge was stopped immediately and the vehicle disconnected and sent away part discharged. There were no other consequences. The hose was translucent plastic with internal carbon steel wire armouring. Continuity had been lost between this and the metal coupling on the end of the hose. The hose had been supplied as having anti static properties but was not subject to regular continuity testing. This was because it belonged to the transport department and not the production plant. The SOP for the operation was also out of date, being for a "walking floor" type of vehicle. This had not been used for between 18 months and two years at this site. The operation had been carried out many times without incident.

The main recommendations were:

1. Procure two new anti-static hoses to be the property of the Plant.
2. Include earth continuity checks in the engineering department schedule.
3. Revise and re-issue the SOP.
4. Circulate Company guidance note on "Rules and Procedures for Sources of Ignition" to all relevant businesses in Group.

[unloading, road tanker, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A 'near miss' potentially major environmental incident occurred when contractors excavated a trench (3 metres deep) 20 metres north of a major underground ethylene pipeline running between England and Scotland.

It was estimated that, if the pipeline had been ruptured, serious property damage within a radius of 5 km, and a flash fire of approximately 500 metre span, would have occurred.

[excavation, human causes]

Lessons

[None Reported]

8513 04 February 1995

Source : OBSERVER, 1995, FEB, 5.

Location : North Sea, UK

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. 100 oil workers were evacuated from a platform as a factory vessel was drifting towards the platform in heavy seas. Oil workers allowed back when tow connected to vessel. Near miss.

[offshore, evacuation, weather effects]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Steam supply near miss. During a draining operation, a pipefitter encountered high pressure in a line thought to have been isolated. In fact the line had not been isolated when work was begun. In addition the work crew had failed to obtain a work permit, and valves in work area were not labelled.

Facility's engineer, who authorised the job, had instructed lock-out/tagout crew to isolate the wrong valves. A work permit would have provided pipefitter with better information about the valves, hot lines, and unusual problems.

[permit to work system inadequate, labelling incorrect]

Lessons

Isolation of systems must be verified before starting work on them. For single valve isolation, a full review of flow diagrams, site line-up, and permit requirements should ensure that the correct valves are identified to secure the work area.

124241995

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An incident occurred at a refinery involving a crane. The incident occurred when a load of scrap metal was to be lifted onto a trailer. At some point in time the crane operator was in the process of lining up a piece of chain, weighing about 8 tonnes on the crane load indicator, on the rear end of the trailer. In order to lay the chain on the trailer properly he swivelled the crane boom past the centre line of the trailer and during this action the crane toppled over. The crane boom smashed on the co-driver side of the prime mover missing the driver who was sitting inside. Fortunately no personal injuries were sustained.

[near miss, plant / property / equipment, safety procedures inadequate, management system inadequate]

Lessons

[None Reported]

124271995

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An incident occurred during the removal of a plug from a depressured furnace coil.

The incident occurred during pressure testing of a radiant cell tube pass of a crude distiller furnace with gasoil, a leak was noted on one of the tubes.

In order to be able to repair the leak, it was decided to empty the coil using nitrogen as the driving medium. A hose was fitted to a steam-out point at the overhead line connected to the coil with the hole in it. The nitrogen purge was left on overnight and the steam-out connection at the coil outlet was checked the next morning.

It was found that only nitrogen was blowing from the drain and this was interpreted as evidence that the coil content had been displaced completely. The nitrogen connection was broken and the coil depressured to atmosphere which was checked at a local pressure indicator and at the drain point itself.

Since all indications were that the system was pressure-free, a clearance was given to the fitters to remove the plug from the horse-shoe type fitting on the tube. When carrying out this job the plug was ejected from the tube with great force into the air by vapour, followed by a stream of gasoil.

Fortunately nobody was injured.

[repair, explosion / pressure release, near miss, piping & fittings, gas oil]

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 : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

During a plant shutdown, on an isobutene plant, a new section of pipework was connected into the wrong line. The error was disconnected during a check carried out before re-commissioning so the fault was rectified before any incident occurred.

[modification, flange, blank, pipeline, plant / property / equipment, design or procedure error, near miss]

Lessons

1. The specific modification, itself, had not been included in the overall shutdown work list. Thus a detailed "job preparation" had not been made out.
2. The wrong line was selected, and marked up, for modification by the project team personnel.
3. Plant personnel did not notice the error.
4. The workers carrying out the work did not react to the fact that they were issued with the wrong type of "blank" for fitting to the line that should have been modified.
5. The blanks issued to them fitted the wrong line.

The following recommendations were stated:

1. Plant personnel to physically check proposal mods.
 2. Full details of all mods to be specified, with supporting diagrams.
 3. Personnel to be reminded to stop and review when something unexpected arise (in this case, issue of the wrong size blanks).
-

1196013 November 1994

Source : ICHEME

Location : , GERMANY

Injured : 0 **Dead :** 0

Abstract

An explosion occurred in an incinerator. The incident occurred when a big lump of ash fell into the quench bath causing a large quantity of the water contents being spilt. There was no damage to equipment nor any injuries.

[near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

During a maintenance shutdown on a petrochemical plant a new pipework tie-in was incorrectly made to a redundant line. The error was discovered before any attempt was made to commission the new pipework. There were no actual consequences but there were safety implications if the error had remained undetected. The internal enquiry blamed the fact that the tie-in point had not been marked on the respective pipe by a competent member of the Process team. Instead it was identified by the Project supervisor from drawings alone. These contained some errors, in particular in relation to presence or absence of lagging. The tradesmen carrying out the work ignored pointers to a possible error such as being (correctly) issued with wrong flanges for the line they were working on.

[design or procedure error, near miss, operation inadequate]

Lessons

1. The problem would have been avoided by physical marking of the tie-in.
 2. The package of engineering information for such jobs should be enhanced to include a general arrangement drawing or sketch showing the proposed arrangement in detail.
 3. Personnel should be alert to clues such as issue of unsuitable flanges.
 4. On-site supervision should be increased to include a supervisor visit to every job.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident occurred following modification to a nitrogen pressure control system on a flaking process in a slurry plant. A new nitrogen pressure let down station was fitted at a plant shutdown with a plant modification request being completed. The "slurry bell" being fed with nitrogen was designed for 22 psig working pressure and had been tested to 38 psig. The existing 22 psig nitrogen supply system was replaced with one which allowed 60 psig pressure. Plant operators unaware of this had been running the process for several days with a manual valve throttled back to control the process. Subsequent investigation showed that the equipment had not been subject to any commissioning trials. Swarf was blown into the reducing valve blocking it open and allowing upstream pressure to run on through it.

[process control & instrumentation, design or procedure error]

Lessons

The Change Control procedure was immediately strengthened to avoid reoccurrence.

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 : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, AUG.

Location : Off Kithira Islands, GREECE

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. A marine tanker with 4200 tonnes of caustic soda grounded. No spillage. Near miss.
[sodium hydroxide, ship ran aground]

Lessons

[None Reported]

6506 14 April 1994

Source : LLOYDS LIST, 1994, 16 APR.

Location : Brent A; North Sea, UK

Injured : 0 **Dead** : 0

Abstract

Mechanical problem on offshore platform well when wireline operations and ball valve became blocked, caused partial evacuation of non-essential staff. Near miss.

Lessons

[None Reported]

Source : FIRE PREVENTION, 275, 1994, DEC.

Location : Essex, UK

Injured : 0 **Dead** : 0

Abstract

A company was fined £17000 (1994) for exposing its employees to fire risks during an incident when 7000 litres of highly flammable ethanol was spilled into a yard area from an open pipeline when work was being carried out to remove an area of plant at the site. The ethanol, flash point 14 degrees C, did not ignite. [near miss, safety procedures inadequate, demolition]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A container was being loaded with shrink-wrapped pallet loads of bagged polyethylene product using a forklift truck. A proprietary mobile ramp was being used to allow access to the container, the platform of which is approximately 4ft above ground level. During the loading operation the ramp became detached from the container and resulted in the forklift truck and driver being placed in a hazardous position.

No injuries were sustained by the driver and damage to the fork-lift truck and ramp were minimal.

The cause of the accident was the failure to adhere to correct operating procedures for locating the ramp to the container.

[loading, operation inadequate, near miss]

Lessons

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

6481 26 March 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, JUN.

Location : Chittagong, BANGLADESH

Injured : 0 **Dead** : 0

Abstract

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

Lessons

[None Reported]

6408 04 February 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, APR.

Location : Mutsure Off, JAPAN

Injured : 0 Dead : 0

Abstract

A marine transportation incident. Collision between a cargo vessel and marine tanker with methyl methacrylate and trichlorethylene. No spillage.
[near miss]

Lessons

[None Reported]

6395 27 January 1994

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, APR.

Location : , NORTH SEA

Injured : 0 Dead : 0

Abstract

An offshore production platform and storage vessel lost 4 of 8 anchors in storm, system shutdown and wells closed in. Production resumed on 2/2/94.
[weather effects, near miss]

Lessons

[None Reported]

6379 11 January 1994

Source : LLOYDS LIST, 1994, 12 JAN.

Location : Karsaz, PAKISTAN

Injured : 0 Dead : 0

Abstract

A rail transportation incident. Derailment of 6 rail tankers containing oil. Near miss.

Lessons

[None Reported]

Source : THE CHEMICAL ENGINEER, 1994, 24 NOV.

Location : Purfleet; Essex, UK

Injured : 0 **Dead** : 0

Abstract

7000 litres of ethanol leaked into yard from an open pipe. The incident occurred when demolition workers opened the wrong valve. The leak could have caused a fire.

Company fined £17 000 (1994) plus costs.

[human causes, spill, near miss]

Lessons

[None Reported]

124191994

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

During recommissioning of a multi-stage LPG pump a near miss incident occurred.

The multi-stage verticle pump was mounted in a barrel sump, a 12 inch pipe of approximately 2 metres ling, which was fixed in grouting.

Upon pressurising the pump, gas leakage followed by an explosion which took place underground, fracturing the concrete and hurling lumps of it around, fortunately without further consequences.

[design inadequate]

Lessons

[None Reported]

124101994

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A potentially serious incident occurred recently on an offshore installation when 12 stud bolts on a production choke valve failed a short time after the well had been brought into production.

An investigation into the failures found that the most likely cause of the bolt failures is due to sulphide stress corrosion cracking. The combination of a high-applied stress and the presence of hydrogen sulphide generated by the hydrolysis of the molybdenum disulphide that was present in one of the greases used during valve assembly.

[bolt failure, near miss]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, MAR.

Location : Off Nuavitas, CUBA

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. A gas carrier with ammonia grounded when leaving port. Cargo transferred and refloated. Near miss.
[ship ran aground]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, MAR.

Location : Rio De Janeiro, BRAZIL

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. A marine tanker grounded with 200 tonnes lube oil additive and 500 tonnes brake fluid. Transferred to another tanker with no spillage.

[near miss, ship ran aground]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, FEB.

Location : Rauma, FINLAND

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. A marine tanker grounded and refloated. Cargo of ethylene glycol transhipped. Near miss.
[ship ran aground]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1994, FEB.

Location : Ressons-sur-matz, FRANCE

Injured : 0 **Dead** : 0

Abstract

A road transportation incident. A road tanker of mono propylene glycol overturned after collision with heavy goods vehicle. Tanker contents remained intact. Near miss.

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident occurred when there was an escape of butylene during the cutting of a 4 inch LPG pipeline near a FCCU battery limits. A contractor's workman cutting the line became aware that the line was not gas free, stopped work and reported the incident to the control room. The gas alarm was raised and measures taken to contain the gas release.

The "all clear" was given after making some repairs to the pipeline, however, a few minutes later gas leaked from the line and the alarm was again raised. The situation was successfully dealt with and the all clear finally given half an hour later. Ignition did not occur, there was no damage or injury to personnel. The incident was reported to the authorities and local fire brigade.

[maintenance, leak,

Lessons

The report stated the following recommendations:

It is essential to gas free and prove by checking every part of a pipeline system before handover for modification; e.g., cutting into the system.

When venting down LPG systems the possibilities of forming ice plugs in the system, leading to a false conclusion that the pressure has been vented down satisfactorily, must always be allowed for and precautions taken to avoid.

The importance of employing contractors with sufficient knowledge to stop work

when an unexpected situation arises is clearly demonstrated in this incident.

The incident could have been much more serious if "hot work" had been in progress.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Flange Gasket Failure. A section of flange gasket in the same isolation valve failed.

Hot work had been stopped because of the previous incident with the packing gland of the valve. About one hour later, there was a request for re-issue of the hot work permit, and discussion was held about the safety of the job site. The unit operator detected a strong smell of fuel gas in the work area and requested a waiting period for the gas to dissipate.

Following further discussion, gas testing at the blind flange of the valve indicated a leak. Maintenance personnel loosened two bolts on the flange to replace the gasket, and suddenly a section of the gasket blew out releasing fuel gas at 50 psig.

Fire water streams from hoses and monitors were applied to inhibit any possible ignition. Since the isolation valve could not be closed any further, the fuel gas header from the fuel gas knock-out pot had to be depressured, which necessitated shut down of crude unit. The incident passed without injury to personnel.

[gas / vapour release, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Operators noticed an overheated line at an offgas treater unit. At that time, preparations were in hand to shut the unit down the following day, for a scheduled shutdown to screen the catalyst. The overheated section of line runs between the sulphur plant tail gas diverter valves and the treater unit in-line burner. A breach of this line would have led to a significant release of hydrogen sulphide to the atmosphere.

The line was red hot in locations near the treater unit in-line burner when the problem was discovered.

The in-line burner was promptly shutdown and the gas flow diverted to the incinerator stack. Nitrogen was introduced into the treater unit to cool the piping.

The emergency response team was activated, and a nearby building in the refinery was evacuated as a precaution. An advanced warning was given, of the situation, and the potential for a leak. However, since the situation was promptly brought under control, only an "all clear" call was necessary. No environmental excursion resulted, no injuries were sustained.

[overheating, shutdown, evacuation, near miss]

Lessons

1. Operators must frequently be reminded of the hazard of high concentration hydrogen sulphide, found particularly in sulphur plant areas, and the need to wear safety equipment when responding to emergencies or breaking equipment containment in any way which can lead to escape of gas or sour liquids.
 2. Overheating of lines due to uncontrolled combustion/sulphur pockets is not uncommon on such units; operators must be aware of rapid actions to take to prevent line or vessel rupture as was done successfully in this incident.
 3. The provision of remote isolating facilities and skin couples on lines where experience indicates problems.
-

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1993, JUN.

Location : Samsun, TURKEY

Injured : 0 **Dead** : 0

Abstract

Sudden wind during unloading of ammonia caused gas tanker to bend jetty loading arm.

[near miss, damage to equipment, weather effects]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

During extension work on an electrical distribution system a false trip occurred of the pilot wire control cables which resulted in an interruption to the 35 kV power supply. The refinery went through the power outage safely, with no injuries to personnel, damage to equipment, spills, or fires. The refinery process was back to normal in less than 24 hours.

The cost due to lost opportunity to produce saleable product and loss from product downgrading during the start-up cycle was \$429,000 (1993), with additional maintenance costs incurred of \$50,000 (1993).

[electrical equipment failure, product loss, near miss]

Lessons

The following recommendations were made:

1. Work on or near to electrical incoming feeders and segments of the distribution system needs to be rigorously planned and controlled.
2. Increasing refinery electrical loads may well put a "strain" on existing protective equipment/monitoring systems.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A refinery suffered a serious near miss incident when with-drawing a corrosion probe from a 14 inch live piping system on a Crude Distillation Unit. Unknown to the inspection engineers, the outer probe holder had suffered stress corrosion in service and had broken completely about 14 inch from the tip during the withdrawal operation.

There was a significant release of light hydrocarbon gases through the annular space between the probe holder and the probe when the broken part of the holder passed the retaining gland.

It proved impossible to close the valve on the tapping into the process line as the piece of the probe holder that had broken away was still lying in the valve body. The piping and associated heat exchanger had to be isolated to stop the release. Fortunately, no ignition occurred, and there were no injuries.

[gas / vapour release]

Lessons

The report stated the following recommendations:

1. When working on pressure circuits on-stream, thought must be given to the possibilities of accidentally breaking containment, e.g. changing corrosion probes, inadvertent removal of thermowells etc,
 2. Materials for all components in a system subject to corrosion must be such that sudden failure will not occur leading to release of hazardous materials.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Near miss on extraction unit at a refinery.

While operators were in the process of isolating burners, an explosion occurred in the heater box. The cause was improper adjustment of equipment while it was being operated, and insufficient operator training (insufficient knowledge).

[operator error, refining, heating equipment]

Lessons

1. Operator training to include study of precautions needed in taking instrument control loops onto manual, in respect of effects this may produce on process.
 2. Fired heater safe operation practices retraining required, e.g., use of remote "heat off" facilities, judicious operation of flue gas dampers, limitations on rate of change in firing, etc.
-

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

An LPG gas carrier broke loose from moorings at a jetty during an unusually severe squall while loading butane. No injuries or damage were sustained but a full investigation was carried out due to the potential of the incident. The loading arms reached the limit of their envelope and disconnected without loss of material. The vessel was brought to anchor after just missing another vessel.
[weather effects, marine transport, inadequate mooring, near miss]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1994, JUL.

Location : Saint John; New Brunswick, CANADA

Injured : 0 **Dead** : 0

Abstract

A rail transportation incident. 10 rail tanker cars of LPG ran free from yard and ended on the main line. They ran free over one public and two private crossings.

[near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

When changing the bursting disc on an ethylene oxide reactor, it was found that the original disc was of the wrong type (reverse buckling) and the holder had been deliberately modified to accept the disc. The locating pin had been ground off.

[near miss, incorrect equipment installed, reactors and reaction equipment]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A mechanical worker was installing a blind joint on the nitrogen line coming in the tower in order to prepare a plant shutdown. The joint was separated from the tower by a valve and check valve. An ethylene oxide leak developed at a one and a half inch flange on the nitrogen injection nozzle on an aldehyde distillation tower.

The following actions were taken:

1. A sea water hose was disposed to absorb the ethylene oxide leak.
2. The heat was stopped on the tower reboilers to reduce the leak.
3. The plant was shut down in order to depressurise the tower as soon as possible.

[preparation for maintenance, plant shutdown, near miss]

Lessons

[None Reported]

123991992

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An operator attempted to clear a blocked drain by removing the 25 mm line and the spring-loaded valve, warmed the remaining 50 mm valve with boiler feed water and then cracked it open. After several attempts the blockage cleared, resulting in a major gas release.

The operator was not wearing breathing apparatus at the time, withdrew immediately and informed another worker by radio. The plant operating crew activated the plant alarm sirens and the emergency depressurising valve to minimise the gas release. The depressurising valve located at an overhead accumulator was kept open to the flare relief system for just two minutes until the operator now wearing breathing apparatus stopped the release by closing the reboiler drain valve.

The surrounding area was evacuated following the emergency occurrence.

[operational activities, gas / vapour release, evacuation, near miss, flow restriction]

Lessons

[None Reported]

Source : THE CHEMICAL ENGINEER, 1991, 12 DEC.

Location : Stanlow, UK

Injured : 0 Dead : 0

Abstract

An operator attempted to clear a blockage in the drain line at the depropaniser reboiler. The drain line was dismantled leaving a ball valve which was found to be blocked but was cleared using steam. A mixture of butane and butylene gases started to escape. The vessel was depressurised via the flare line. The gas hit a slug of liquid and caused the flare line to dislodge from the supports and buckle but not rupture. The valve was blocked with scale and discarded welding rods.

[damage to equipment, maintenance, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

An incident occurred at a gas power plant when live cables were cut accidentally. The operator stopped work immediately and reported the incident to his supervisor. Cable cutting work was suspended.

[near miss, demolition, permit to work system inadequate]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 1 Dead : 0

Abstract

During a plant start-up, a plant superintendent was splashed with ethylene oxide whilst closing a drain valve on a reactor feed system. She developed a large blister and swelling of the foot and ankle. She was not wearing appropriate protective clothing. Although she used a safety shower to remove ethylene oxide from her overalls, she did not strip off contaminated clothing and wash thoroughly until about 1 hour later. She did not inform a First Aider.

The valve had apparently been checked shut (by two people) as part of start-up procedures: however it may have been jammed open (giving the impression of being shut). When an upstream block valve was opened, the leak of ethylene oxide occurred and the supervisor moved quickly to shut the drain valve to minimise the danger of fire/explosion.

[start-up, , isolation inadequate, safety procedures inadequate, reactors and reaction equipment, near miss]

Lessons

The large number of recommended actions included:

1. The blanking/plugging of open vents and drains on ethylene oxide/propylene oxide duty, and a survey for the need to do this on other similar chemicals.
 2. Better procedures for valve operation (ie ensuring that valves are not left 'hard open'.
 3. Improved awareness of the need for full protective clothing if dealing with loss of containment of ethylene oxide.
 4. Reinforcement of the correct decontamination procedures if splashed with ethylene oxide. Also the need to inform First Aider and note in Accident Book.
 5. Improved training in the correct action to be taken in the event of an accident.
-

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

On a polyethylene plant a leak on the main body flange of a cyclone led to the release of three tonnes of ethylene over a period of 6 hours. The release was caused by joint failure of a temporary gasket. This gasket had been employed in the absence of the standard replacement gaskets. Applicable management of change procedures had been followed to approve and document the plant modification. There was no injury to personnel or damage to equipment, the release was high in the plant structure, remote from other vessels and sources of ignition, so no fire or explosion occurred. All emergency procedures were correctly observed. The failure of the gasket was the result of a number of coincidental factors which resulted in a reduction in seating pressure to a level below that required for pressure containment, the most significant being:

1. A finer than recommended surface finish on the flange faces reduced the "mechanical key" effect obtained with a coarser finish and allowed the gasket to slip more readily.
2. The presence of a pull-lift/sling diametrically opposite the leak position producing an external load on the joint
3. Inadequate torquing of the flange bolts.
4. Poor quality stud bolt cleanliness.
5. The presence of high amplitude vibrations around the cyclone area under certain operating conditions.

[gas / vapour release, near miss, separation]

Lessons

A number of general recommendations were made to avoid recurrence of this and similar incidents:

1. Incorrect tools or materials should not be used to strike the exterior of vessels such as bins or silos to alleviate internal bridging problems.
2. The findings of the investigation report should be communicated to a wider audience to heighten the awareness of possible problems resulting from pipework and equipment vibration.
3. In torquing and tensioning applications, clean, lubricated bolts and clean flange faces are required to produce secure joints.
4. For certain gasket materials, flange surface finish is a significant factor.
5. Where plant modifications are carried out which involve deviation from any internal or external standards or codes of practice, then relevant management of change procedures must be followed, and the modification must receive the appropriate level of review and authorisation.
6. Where single source gaskets or other components are used, then adequate replacement supplies must be available, and other options should be evaluated to lessen the dependence on the single source supply

Source : LOSS PREVENTION BULLETIN, 118, 14.

Location : Essex, UK

Injured : 0 **Dead** : 0

Abstract

A double compartment stainless steel road tanker was steam cleaned than loaded with fermentation ethanol. After unloading, the driver noticed a blue and yellow mark on the bottom of the tanker barrel below the manway. The matter was investigated and the most likely explanation for this incident was as follows:

The road tanker became charged with static operation (the driver carried out the steam cleaning and says that the tanker was not earthed during this operation). The road tanker was still highly charged when it arrived at the loading bay and it seems likely that the flexible loading hose was lowered into the tanker barrel before the earthing clamp was attached to the tanker. This could have led to a static discharge occurring between the bottom of the tanker barrel and the end of the flexible hose. It seems likely that the small amount of ethanol drainings left in the hose from a previous filling operation were ignited by the static discharge and caused the discoloration of the stainless steel tanker barrel.

[near miss]

Lessons

1. That tankers should always be earthed during steam cleaning operations.
 2. That tankers should be earthed immediately on entering a flammable liquids loading bay prior to carrying out any other operation.
-

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A new 10 inch propylene recycle pipe work outside the control room had moved violently when the trip valve had been reset. The pipe lop immediately adjacent to the control room cam to rest approximately 12 inch away from its foundation support.

It was established that no hydrocarbon release had occurred and within five minutes the line was isolated. No personnel injuries were sustained.

Visible damage to the pipework appeared to be minor but the drain valve stubs adjacent to the trip valve were bent by about 45 degrees. The pipe showed evidence that it had moved on its supports downstream of the trip valve and the loop of the pipe was distorted.

[damage to equipment, near miss]

Lessons

[None Reported]

4887 14 February 1990

Source : MARINE ACCIDENT INVESTIGATION BRANCH, SUMMARY OF INVESTIGATIONS, 1990, MAR.

Location : River Thames, UK

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. A marine gas carrier with LPG (propane and butane) was in collision with sunk head tower. No cargo release. Near miss.

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A depropaniser heat exchanger had been cleaned. The polymer that was removed was put into drums labelled "Aluminium Chloride". The cleaning team asked the shift manager to arrange for disposal of the drums.

However, there was a delay of several months in removing the drums. They were left on a gravelled area close to passing traffic.

The situation was brought to the attention of the shift manager when an instrument supervisor noticed that one of the drums was pierced.

It was realised that events of this kind could lead to serious consequences if the waste material could react with remains of the substance left in an uncleaned drum or if the waste material were itself hazardous.

[near miss, storage, design or procedure error]

Lessons

The following recommendations were made:

1. A procedure is needed to cover all aspects of depropaniser cleaning.
 2. All drums must be correctly labelled.
 3. Provide labels for all materials put in drums.
 4. Drums awaiting disposal to be stored in a cordoned off area.
 5. Expedite the removal of drums. They should be removed within one week after completion of the cleaning operation.
 6. Drums supplied to the cleaning team must be clean.
-

Source : ICHEME

Location : ,

Injured : 1 **Dead :** 0

Abstract

At the end of a maintenance stop, catalyst was refilled into a reactor vessel. No special breathing equipment was needed as the reactor was filled with air. At the end of the working day, the job was not yet finished; the crew covered the manhole with a metal sheet, returned the work permit to the control room and left the site.

Next day, the men returned to the reactor to continue the filling operation. The supervisor went to the control room to collect the work permit. In the meantime, the rest of the crew removed the metal cover from the manhole and one of them donned his harness, to be lowered into the reactor by a crane.

Just as the man entering the vessel was disappearing through the manhole, the crane driver noticed that he suddenly collapsed. The man was pulled out immediately, and after receiving medical treatment he recovered completely.

[reactors and reaction equipment, asphyxiation, near miss, permit to work system inadequate, entry into confined space, injury]

Lessons

123951990

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident occurred on a platformer. The incident occurred when using the nitrogen main to purge out pipework on the regeneration section, operators noticed that the hose was icing up and immediately stopped the operation.

Investigation into the incident revealed that the nitrogen system was contaminated with an LPG type material.

The operators quickly traced the source of contamination to a nitrogen purge connection on the suction side of a compressor in the unit normally operating at 12 bar(ga).

Further investigation into the purge connection found that the spectacle blind was in the open position and that one valve was still in the open position and the closed valve was passing.

[purging, contamination, mechanical equipment failure]

Lessons

[None Reported]

123961990

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident. As part of the routine start-up procedure for a gas-treating plant, the sulfinol section was subjected to a leak test under nitrogen pressure.

After passing this test satisfactorily, the section was being filled with sulfinol solution while another section of the gas-treating facilities was prepared for inerting and pressure testing.

Before being connected between the nitrogen utility points and the process piping, the hoses were routinely blown to atmosphere to ensure that they contained no foreign matter. In this instance, however, the operators noticed that the nitrogen system contained sulfinol solution.

Investigation showed that on the permanent nitrogen connection to the sulfinol system:

1. A manual valve had not been closed;
2. A spectacle blind was not turned to the closed position;
3. The internals of a non-return valve were not installed.

[design or procedure error]

Lessons

[None Reported]

4815 29 December 1989

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1990, APR.

Location : Lake Erie; Buffalo, USA

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. A marine tanker went aground with a load of xylene and toluene. Tear in outer hull but no loss of product.
[near miss, ship ran aground]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. A coastal tanker carrying a cargo of motor gasoline struck pipetracks at a jetty while attempting to berth. Fortunately no injuries occurred in the incident.

Despite structural damage and product pipes being displaced, no leakage or spillage occurred.

[marine vessel snagged pipeline, near miss, damage to equipment]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A faulty limit switch on the cage door of a hoist cage nearly caused a very serious incident, fortunately the persons involved were not injured.

The incident occurred when an operator boarded the hoist at ground level. The hoist was stopped at the designated area, the cage and landing doors opened.

The operator stepped out of the cage but as he did so, with out warning, the cage began to move downwards. The operator fell back into the cage but, fortunately, was caught by his colleague, who then attempted to stop the cage with the stop button but found that when he released the button the cage continued downwards.

The cage was eventually stopped by pressing the power isolation button.

The following conclusion was made:

The cage moved downwards with both cage and landing doors open when the ground floor #down# button was pressed, because two separate safety interlock systems failed to work.

[near miss, safety equipment failure, lifting hoist, mechanical equipment failure]

Lessons

[None Reported]

4693 30 August 1989

Source : HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1989, OCT.

Location : Riihimaki, FINLAND

Injured : 0 Dead : 0

Abstract

A rail transportation incident. An express train and goods train were in collision. Butane tanker did not derail and was protected by adjacent buffer cars. Near miss.

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A special tank containing 450 litres liquid nitrogen with four wheels was lifted onto a loading ramp by means of a forklift truck. When the mobile tank was set down on the ramp it started to move and went over the edge of the ramp with two wheels. A quick counteraction of the driver prevented the tank falling down.

Cause: The wheels of the tank had not been braked before it was lifted.

[near miss, transportation, human causes]

Lessons

The following recommendations were made:

The wheels of mobile containers must always be secured. When a mobile container is set down, the forklift driver must check its stability before leaving it; the tank could also have started to move at some later time.

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A steel beam, which was being lifted to a frame extension slipped out of its sling and fell to the ground narrowly missing a worker.

No injury occurred to personnel and no damage occurred to equipment.

An investigation into the incident found that the beam being lifted was incorrectly slung.

[lifting equipment, construction, near miss, human causes]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, JAN, 1989.

Location : , SINGAPORE

Injured : 0 Dead : 0

Abstract

A marine transport incident. For reasons unknown, a ship began to capsize during loading operations. The cargo included plywood, drilling mud, drilling equipment, general cargo containers and other containers laden with cyanide. A deck crane on the edge of the jetty prevented the ship from rolling over. Fortunately there were no injuries.

Within a few hours, a heavy lift crane was being prepared to come to the aid of the stricken vessel.

Fortunately, the floating crane was already close by and by the afternoon of the same day it had arrived at the scene.

The crane, which has a 1,000 tonnes maximum lift capacity, supported the vessel and gave full control as operations began to pump out the flooded engine room and steering gear space.

Water in the flooded hold was sampled and found to be contaminated with cyanide.

[near miss, contamination, cyanide product, unidentified cause]

Lessons

1. Cyanides are toxic if swallowed, by skin contact or dust inhalation. On contact with water cyanide may form a weak hydrogen cyanide solution.
 2. Cyanides must be stowed away from acids with which they react, giving off highly toxic and flammable cyanide gas.
-

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

At approximately 14.00 hours on 5th September 1988, an air supply hose on the discharge side of a portable breathing air receiver became detached whilst in use.

One individual was carrying out an internal inspection of the Solvent Recovery Column at the time. He was therefore immediately deprived of an air supply. Very prompt action by the compressor attendant, with the assistance of a fireman enabled restoration of the air supply within a few seconds. An emergency call was made to the Fire Station for additional backup, but the individual concerned was able to make his own way out of the column, and suffered no physical effects.

On examination the crimping rings attaching the pressure hose to the bayonet connection were found to be loose and showed no signs of ever being compressed.

Following the incident, all work involving mobile breathing air systems was stopped. It turned out that all hoses arrived in vacuum sealed packs which were only opened at the work-site. No inspection or testing was therefore performed and no documentation accompanied the hose to indicate what Quality Assurance procedures had been followed.

[inspection, entry into confined space, near miss, breathing apparatus, air line, human causes, design fault]

Lessons

All hoses were examined and certified on site immediately.

Some hose lengths were found to have only one crimp-ring applied, rather than the usual two. Initially it was accepted that a second ring should be applied.

However, the contractor subsequently discussed this matter with the supplier who advised against this course of action. Clamping is normally carried out whilst the hose is being heat-shrunk onto the fitting. Any attempt to add a second clamp 'cold' might affect the integrity of the original bond.

All such hoses were therefore withdrawn from service, and have been replaced by others, which incorporate an improved coupling design.

For vessel entry the statutory requirement is for an outside observer who is similarly clothed (and therefore has breathing apparatus (BA) at the ready) whose primary responsibility is to summon assistance in the event of a dangerous situation arising, and to then attempt a rescue. The shutdown arrangements require each party to make its own arrangements for observers. This could therefore involve personnel who had only limited BA training. This situation was revised.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A driver used his forklift truck on a loading ramp. When he stepped on the hydraulic footbrake to stop, there was no reaction. He still managed to switch his truck to "reverse", which prevented a fall from the ramp in the very last moment. Possible causes were:

1. Mechanical
 - a) Leaking brake cylinder, loss of hydraulic fluid
 - b) Humidity or air in the hydraulic system
2. Operational
 - a) Operating error: In normal operation, the right foot of the driver must be positioned in the "dead man pedal". The hydraulic emergency brake system is activated by lifting the left foot. (Note: On this machine the drivers position is standing up; "normal" braking is done by switching the machine to reverse motion).
3. Too frequent use of the hydraulic emergency brake system will cause excessive heating and finally failure of the system.

[near miss]

Lessons

The following recommendations were made:

Since the exact cause could not be identified with certainty, the following measures were taken:

1. All brake cylinders were changed
 2. Crown forklift trucks may be driven only by employees having received special training for this type of machine
 3. Normal braking must always be done by use of the "reverse" switch
 4. This type of forklift is fitted with a speed limiting device
 5. Special operating instructions are posted on this type of forklift truck.
-

13125July 1988

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Some 6.1 tonnes of palletized goods had been placed into the cabin of a hydraulic elevator. Although the maximum permissible load was 7,3 tonnes, an employee drove a loaded forklift truck with a total weight of approx. 4 tonnes into the elevator.

After a short moment, the lift moved downwards. The driver pushed the stop button, which produced no effect. He saved himself by jumping out of the cabin into the building. The loaded forklift, on its downward trip, ground against the wall of the elevator well, moved to a diagonal position and broke through the elevator door on the lower floor; it fell sideways when it rolled out of the elevator.

Cause:

The elevator had been overloaded by some 40%. Due to this overload, a weak component in the hydraulic system failed.

[damage to equipment, human causes, near miss]

Lessons

The following recommendations were made:

Installation 'of barriers in the cabin of the elevator so that the floor space, where pallets can be placed, is more limited
Technical improvement of the hydraulic system Instructions

9906 23 May 1988

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A radioactive static eliminator, containing polonium, was in place on 20 May 1988 but was missing on Monday 23 May. The polonium 210 was encapsulated in silver foil and mounted in a stainless steel casing. In this form it presented a minor risk, but if the containment were broken skin contact with the polonium would present a toxic hazard.

The purpose of the device was to remove static electricity from plastic bags during their manufacture. It generated alpha particles which ionised the air, and which have a maximum range of 3 cm. Polonium has a half life of 138 days.

The location of all radioactive static eliminators on site was logged in a book held by the Maintenance Services Superintendent. From Mondays to Fridays a daily check was made by a Technical Officer and a form was completed to show that all eliminators were present. Whenever an eliminator was moved from a machine a form was completed and sent to the Superintendent who amended the log book.

When the eliminator was missed a immediate search of the site was made, and all relevant personnel were interviewed. After two days, as the eliminator was still missing, the loss was reported to the appropriate authorities. The eliminator was never recovered.

[human causes, near miss, processing]

Lessons

The checks on radioactive static eliminators were increased to include Saturdays and Sundays (that is to seven days per week). After reporting of the loss to the Authorities enquiries were received from the local press. A press release was issued to local newspapers; interest by the press and the Authorities diminished and the matter was able to be closed.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A flash-back occurred as a blind was being removed from the outlet pass of a furnace, as it was being prepared for recommissioning after steam/air decoking. A crude preheat furnace was shutdown mid-run for decoking. On completion of the Steam-Air decoking procedure a maintenance fitter was deblinding prior to recommissioning.

As a precaution, because hydrocarbons could be present, the fitter was instructed to wear a fresh air mask, which was supplied by an air line.

Working from the burner platform, the fitter loosened the flange bolts (6" x 300 joint) with an accompanying whistle noise as the nitrogen pressure released from the flange joint. As the fitter lifted the blind (approximately half out) some liquid drained out (most likely condensate from the steam purge which was done when the blind was installed prior to the Steam-Air Decoking).

There was an explosion, and a fire ball flashed across the burner platform from the central burners back to the loosened flange. The gas, escaping from the tower side of the blind, had entered the heater through the slots for the air register adjustment lever. The fitter left the platform, fortunately only receiving some singeing to his hair.

The source of ignition was a pilot burner the potential hazard of ignition from this source was overlooked during the preparation for removal of the blind. The source of ignition may not have been a hazard had both sides of the blind been purged.

[fire - consequence, near miss]

Lessons

The accident investigation report recommended:

1. Positive isolation on both sides eg. at a double block and bleed. "Positive isolation" should be checked by opening the bleed, although care should still be exercised when breaking the flange in case the bleed is plugged, or
 2. Positive isolation on one side and show of steam on the other. "Positive isolation" should be checked by carefully breaking of the flange to ensure that the valve is not passing, or
 3. Show of steam on both sides.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A road transportation incident. An ethylene oxide road tanker was overfilled with 19.8 tonnes instead of 18.6 tonnes.
[overflow, near miss]

Lessons

[None Reported]

9989 05 January 1988

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

Men who were cleaning a tank were wearing breathing apparatus as a safety measure for entry into confined space. Soon after they started they found that the air supply failed, but they were able to exit the tank without any adverse effect. This safety equipment failure was found to be due to ice blockage in the air filters, and was a near miss of asphyxiation.

[entry into confined space, safety equipment failure, management system inadequate]

Lessons

There was inadequate testing and inspection of the operation for recharging the air supply to the breathing apparatus. Concern was expressed over the apparent failure to meet statutory requirements.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A truck/trailer composition was being unloaded.

A forklift truck had picked up a load on the trailer and was moving towards the unloading ramp. Suddenly, the truck/trailer combination started to move. The forklift driver managed to stop his machine just in time to prevent it falling down.

Causes:

1. The forklift driver had forgotten to place a STOP sign in front of the truck before he started unloading it.
2. Violation of regulations: Vehicles not yet released from customs must not be driven to the unloading ramp.
3. Disregard of instructions: The foreman of the unloading area had instructed the driver of the truck/trailer and the forklift driver which had already moved his machine on the trailer that unloading had to be postponed for 30 minutes, to allow for a customs inspection. The forklift driver then switched off his engine. The foreman went to another lorry. The driver of the truck/trailer combination started his vehicle to drive back to the waiting area, without contacting the forklift driver. The forklift driver started unloading, contrary to instructions.

[unloading, near miss, human causes]

Lessons

The following recommendations were made:

Safety rules must be followed (e.g. placing the STOP sign prior to loading or unloading a vehicle).

It is essential that instructions are clear, that they are understood and followed.

Source : ICHEME

Location : , UK

Injured : 1 Dead : 0

Abstract

An operator was operating the cooling water supply and return valves on the reactor cooling circuit. This was a routine which on average took place four times in every day and was therefore a familiar and well practised operation. Having completed this operation he turned away from the valves and unfortunately caught his foot on a loose kicking strip, stumbled against equipment and bruised his left hand and back. The victim was treated at the Medical Centre, went home and telephoned in with confirmation that he was to remain immobile to relax his damaged back. Efforts to confirm his condition by visiting failed due to the nature of the holiday season and so his condition was not confirmed until a week later. The area was inspected by the Works Manager and the Manufacturing Manager and it was agreed that the loose kicking strip would be removed as it was serving no useful purpose, and also that although the area was congested it was a routine operation, well practised by all operators.

[normal operations, maintenance, electrical equipment failure, near miss, reactors and reaction equipment]

Lessons

Repair the flooring in the area and remove the kicking strip. Clean the lighting to improve the local visibility.

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

A falling liquid level in a fluid catalytic cracker unit (FCCU) resulted in a complete loss of slurry reflux cooling. This in turn led to serious process disturbances on the crude distillation unit (CDU) with temperatures reaching very high levels.

The situation was eventually brought under control without a major catastrophe or injuries to personnel.

A routine crude change on CDU 1 was taking place. During this operation there were various interruptions to the crude supply due to intermittent loss of pump suction and the CDU 1/FCCU board operator's attention was focused completely on the crude board. He failed to notice that the change in FCCU feed quality caused a low level in the bottom of the FCCU main fractionator, which in turn caused a complete loss of slurry reflux cooling.

Actions taken by the operators to correct this led to low outlet temperatures on both FCCU risers.

These conditions caused feed forward of large quantities of unvaporised oil to the regenerator for nearly an hour.

Limited excess combustion air capacity ensured that the majority of oil entering the regenerator was vaporised, cracked and flowed forward to the main crude pre-heat furnace. Ample excess air in the combustion zone of the furnace allowed combustion of most of this additional fuel. Crude coil and fire box temperatures exceeded 750 degrees C (1400 degrees F) and 1600 degrees C (2900 degrees F) respectively, for a period of 90 minutes. Due to mechanical damage and design restrictions, FCCU flue gas was unable to be fully bypassed around the furnace until 70 minutes after commencement of oil feed forward.

Operators did not recognise the FCCU riser feed forward until 60 minutes after commencement of the incident. They initially concluded that a furnace crude tube failure was the source of excess combustion material in the furnace firebox.

Emergency procedures for tube failure were implemented correctly, but this action did not of course address the real problem.

Within 75 to 80 minutes after initial high temperatures were experienced in the furnace and whilst furnace isolation was proceeding, the crude coil failed in two places. During the same period, an LP steam superheat coil in the heater also failed. One crude coil failure released residual oil/steam which combusted with a torch effect destroying approximately 50% of the crude coil. During further isolation activities, the main crude pre-heat furnace boiler feed water (BFW) coil and the BFW coil in the parallel crude furnace were blocked in without by-passes being opened. Total loss of steam generator water supply occurred immediately which resulted in loss of steam drum water levels in all three boilers. Two of the three boilers were manually shut-down within minutes. The remaining boiler stayed on line while the operator re-established water supply. Despite having lost water level, No.1 Generator was not shut-down for 15-20 minutes. As no low level trips are installed on any of the boilers, the latter two in the shut-down sequence sustained damage caused by continued heat input without steam drum water level.

Total steam failure occurred for 25 minutes. Restoration of steam supply on one boiler, albeit at 40% of normal pressure, was secured some 20 minutes after initial loss of supply. At the time of, or subsequent to the loss of the BFW supply to the boilers, the main crude pre-heat furnace water coil failed.

After cessation of riser oil feed forward on the FCCU, residual hydrocarbon caused high temperature burns in the regenerator for 90 minutes.

Temperatures in excess of 100 degrees C (1840 degrees F) were observed, while physical evidence indicates that 1100 degrees C (200 degrees F) was probably achieved.

Unit conditions were secured progressively between 2.5 and 3.5 hours after the initial FCCU incident commenced. Near miss.

[mechanical equipment failure, cracking, fluid cracker]

Lessons

[None Reported]

4003 30 October 1987

Source : LLOYDS LIST

Location : Lake Hamana, JAPAN

Injured : 0 Dead : 0

Abstract

A marine transportation incident. A chemical marine tanker carrying isopropyl alcohol in collision with ship. No chemical spillage.
[near miss]

Lessons

[None Reported]

3997 14 October 1987

Source : LLOYDS LIST

Location : Oigawa, JAPAN

Injured : 0 Dead : 0

Abstract

A marine transportation incident. A marine gas tanker in collision but no release of gas.

[marine tanker, near miss]

Lessons

[None Reported]

1200307 August 1987

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A rail transportation incident. A rail tanker of propylene was involved in a collision with a train hauling coal. There was no leakage from the tanker which was repositioned on the track.

[near miss]

Lessons

[None Reported]

3949 17 July 1987

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A butadiene spill occurred at a flange at a flare stack when the flange was opened to clean out the water overflow line. There was no ignition.
[near miss, cleaning]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 2 Dead : 0

Abstract

A potentially serious incident occurred on a residue cracker resulting in a unit shutdown of 35 minutes duration.

An instrumentation problem caused the regenerated catalyst slide valve to shut fully and the resultant loss of catalyst circulation, followed by reduction in reactor temperature allowed unvaporised hydrocarbon to pass to Regen 1. A thick yellow plume of unburnt hydrocarbon mixed with flue gas and some catalyst discharged from Regen 1 stack for approximately 15 minutes, via the carbon monoxide burner.

During the incident the carbon monoxide burner tripped on low steam drum level due to loss of carbon monoxide in flue gas.

The sudden increase in steam demand caused problems for the main refinery boilers resulting in prolonged emission of black smoke and shutdown of the solvent de-waxing unit which has a very high steam usage.

When the carbon monoxide burner tripped, a sudden release of flue gas and hydrocarbon occurred from the main seal tank vent at ground level, necessitating sounding of the refinery emergency siren. An operator and a laboratory technician were affected by vapour inhalation when caught in the vapour cloud. No damage was caused to equipment as a result of the incident.

[plant shutdown, instrumentation failure, near miss, gas / vapour release, refining, cracking]

Lessons

This is a good example of how a single equipment item failure which should have been dealt with almost routinely, resulted in a chain of events which uncovered numerous deficiencies in system, design, equipment reliability and operator training.

All these problems, which themselves may have been minor, contributed to a potentially catastrophic situation. All equipment which contributes to the safe operation of the plant must be maintained in good working order, even process water piping.

The possibility of hand radios interfering with process control instrumentation poses problems for refineries.

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

Abstract

A contractor pipe-fitter partially cut through a pipeline containing butane. The area was evacuated but fortunately the incident did not escalate.

Work was being carried out by the contractors on a number of specified tasks. A supervisor from the contractors was in charge and a Permit-to-Work was in force for the specified tasks.

The supervisor decided to prepare for a further task and explained to the pipe-fitter the extent of the work. The intention of the supervisor was that he would then obtain a hot work permit from the assigned authority. However other work distracted him from doing this immediately, during which time the pipe-fitter commenced work. He started cutting through a butane rundown line with an electrically operated angle grinder. He had partially cut through the line when he noticed a leak which he immediately reported to the Permit Control Supervisor. All hot work was stopped and the area evacuated. Fortunately a large system of downstream piping had been depressured for the installation of battery limit blinds and only a fraction of the rundown pressure had been established via a passing valve.

Near miss.

[maintenance, evacuation]

Lessons

The importance of contractors being made fully aware of the hazards associated with maintenance work in hazardous areas is borne out by this incident.

When contractors are brought on site they should receive good induction training followed by periodic monitoring to ensure that the safety standards are observed.

1022910 April 1987

Source : THE TIMES, 11 APR, 1987.

Location : Wiltshire, UK

Injured : 1 Dead : 0

Abstract

A road transportation incident. The driver of a gas filled road tanker prevented a major disaster by driving his road tanker away from a fire.

The driver caught fire when the gas he was delivering to a cottage in a village exploded.

He then threw himself into a nearby river before going back to the overheating bulk tanker, which he drove 200 yards away from the fire taking hold of the cottage.

He then jumped out of his cab and told a passing policeman how to make the tanker safe, then collapsed at the officer's feet.

He was taken to hospital suffering 20 percent burns.

[near miss, explosion, fire - consequence, unloading]

Lessons

[None Reported]

13122March 1987

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A night guard on his rounds observed the development of fumes from a charging station. The fumes came from the battery of an electric handtruck, which was probably defective.

Note: If the incident had not been observed, an explosion of the hydrogen/air mixture being formed would have been possible.

Cause: Battery too old.

[gas / vapour release, near miss]

Lessons

Programmed battery checks.

Source : ENDS REPORT 151, AUGUST 1987.

Location : Huddersfield, UK

Injured : 0 **Dead** : 0

Abstract

Nitrogen oxides were released well above permitted limits from a nitric acid plant and were allowed to continue for 12 hours before the plant was shut down. The wind took the fumes away from nearby houses.
[gas / vapour release, plant shutdown, near miss]

Lessons

Source : FIRE PREVENTION 211, JUL/AUG 1988.

Location : Gloucester, UK

Injured : 1 Dead : 0

Abstract

A mechanic was drawing fuel from a car on a raised inspection ramp in a workshop when he accidentally dropped a portable inspection lamp. The lamp shattered in or near a tray containing petrol causing a fire. The mechanics clothes caught fire but he was removed to safety by his colleagues. The blaze, which firemen brought under control in fifty five minutes, severely damaged the car on the ramp and caused fire and smoke damage to a small area of the workshop roof.

Severe fire, smoke and water damage occurred to 80 per cent of the showroom, 90 per cent to the stores area and 90 per cent damage to the roof.

An oxy-acetylene welding kit in the vicinity of the fire created a possible explosion risk and acetylene, propane and oxygen cylinders had to be cooled prior to removal from the workshop.

[hand tools, fire - consequence, near miss, hot surface, gasoline, damage to equipment]

Lessons

[None Reported]

Source : THE SAFETY PRACTITIONER, MAY 1987.

Location : , UK

Injured : 0 Dead : 0

Abstract

Two employees of a ship building company escaped crippling foot injuries due to fortunately wearing safety footwear with built in steel toe caps. These incidents occurred on separate occasions.

The first occurred when a works guard was closing the main entrance gate. This was a wrought iron gate approximately 13ft x 10ft and weighing one and a half tonnes. As he pulled it towards himself the bottom of the gate struck his left foot which was then trapped beneath the bottom of the gate and the concrete driveway. The bottom of the gate ripped though the leather covering the toe cap of his safety boot and severely dented the cap itself. Fortunately the guards toes were undamaged.

The second occurred on 26 February when a fitter was shutting a large sliding door, when it swung towards him because the bottom runners had sunk. The door swung outwards and as it swung back again it struck his right foot. The top of his safety boot was ripped right open to expose the built in steel toe cap beneath.

[near miss, people]

Lessons

[None Reported]

125571987

Source : SAFETY MANAGEMENT, MARCH 1987.

Location : , UK

Injured : 1 **Dead :** 0

Abstract

A contract steel erector fell 30 feet whilst a new smelter was being installed at a smelting firm. The incident occurred as the worker stood on a three inch wide beam while a platform was being lifted into place by a crane. The contractor was struck by the railing and fell.

The company was fined £200 (1987).

[fall, near miss, construction, injury]

Lessons

[None Reported]

123201987

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A road transportation incident. A vehicle loaded with a skip containing highdensity-spent catalyst had been reversed to the edge of the chute to a barge. The hydraulic supports were lowered, but not checked for correct positioning.

It is thought that they were actually positioned onto the 10cm high wooden beam on the ground in front of the chute. The driver started the unloading by means of the control levers inside the cabin and supervised the unloading whilst sitting in the open cabin door.

Suddenly the lever between the hydraulic arm and hook of the vehicle and the iron rod of the container broke, causing the container to swing out. The whole vehicle was shifted backwards and the hydraulic legs lost their support. The centre of gravity was shifted too far backwards and resulted in the vehicle toppling over onto the barge. The driver was thrown into the water and escaped injury.

[plant / property / equipment, near miss, design or procedure error]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1987, JAN., 43; COURIER, 1986, 11 NOV.

Location : Firth Of Forth, UK

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. A marine tanker carrying butadiene raffinate went aground in high winds. The cargo was pumped to another ship. There was no spill.

[ship ran aground, strong winds, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A marine transportation incident. An ethylene ship was being prepared for sailing. The ethylene loading arm had been removed and a fitter and jetty operator were in process of disconnecting the water supply hose from the ship.

A single masted, two jibbed, crane had been in use for the loading operation. One jib supported the ethylene loading hose and the other, the cooling water hose. The wire lifting rope, supporting the ethylene loading hose, failed. As a result, the hose fell approximately 20 feet onto the jetty head, narrowly missing the jetty operator.

[near miss, mechanical equipment failure]

Lessons

Inspection showed extensive corrosion of the failed rope, in the area of failure and tests confirmed that corrosion was the predominant failure mechanism.

About 60% of the 95 individual wires had corroded through, due to a general lack of lubrication. Lack of lubrication, the marine environment concerned, would result in rapid corrosion. An inspection, about one month before the incident, had revealed a need for rope cleaning and lubrication. This had not been done, but was planned for the week following the incident.

Clearly, the main lesson was the need to ensure regular and routine rope lubrication. Other recommendations included:

1. A standard rope to be specified, to avoid use of various types of rope.
 2. Inspection and testing of all associated equipment (loading hoses, the other rope, mast, jibs, winches, pulley, blocks) before further use.
 3. Review of inspection schedule frequency.
 4. review of material and construction of rope with a view to identifying a more corrosion resistant system.
-

Source : HEALTH & SAFETY AT WORK, NOVEMBER 1987.

Location : , UK

Injured : 1 Dead : 0

Abstract

A worker escaped with injuries after nearly being buried alive when a bank of earth collapsed after heavy rain.

The incident occurred as the worker was digging away a previous earth fall. The worker suffered a dislocated hip and extensive bruising in the earth fall.

The company was fined £900 (1987).

[near miss, human causes, earth movement, injury]

Lessons

The report stated the following:

Any soil already subject to an earth fall caused by overnight rain should have been a prime candidate for suspicion. A further fall was always a strong possibility to be countered without delay by battering back to a safe angle or by the use of suitable support and projection.

3627 21 May 1986

Source : FINANCIAL TIMES, 1986, 13 JUN.

Location : Skarzysko Kamienna, POLAND

Injured : 0 **Dead** : 0

Abstract

Fire threatened the release of chlorine gas.

[fire - consequence, near miss]

Lessons

[None Reported]

123131986

Source : ICHEME

Location : ,

Injured : 1 Dead : 0

Abstract

An operator collapsed whilst working on a hydrodesulphuriser unit. The incident occurred when the H₂S alarm sounded the operator ran from the area and collapsed.

An investigation into the incident revealed that the source of the H₂S was the vacuum drier ejector condensate separator vessel, which vented to an atmospheric pressure header, which discharged at a safe location. Over-pressuring of the vessel was prevented by means of a water-filled swan-neck arrangement.

Disturbance of the plant operation had given rise to abnormally high gas flows, but the effect was increased due to restriction of the vent header discharge due to a partly blocked vent line and flame arrestor.

As a result the seal on the gas/liquid separator was blown and H₂S containing gas was released.

The report stated the following conclusions:

Depressuring of the 28m tall ethylene storage vessel to approximately atmospheric pressure caused the bottom connection between the vessel and a full-length level indicator to fail. The failure was due to a high temperature difference between the vessel and the level indicator.

Failure of the nozzle resulted in a liquid ethylene leakage, which was rapidly vaporised causing a potentially dangerous situation. Fortunately the gas cloud did not ignite.

[hydrogen sulphide, gas / vapour release, injury, mechanical equipment failure, near miss, normal operations]

Lessons

[None Reported]

9695 03 October 1985

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

Road transportation incident. During near gale force winds a contractor's vehicle was about to cross the main country road from one side of the site to the other, when the wind blew one of the road barrier arms across the vehicles path. The arm was made of one eighth of an inch thick aluminium, 14 feet in length and 3 inch diameter. The arm penetrated the cab on the passenger's side (fortunately no passenger at this time) and travelled two and a half feet into the cab. [strong winds, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , OFFSHORE, CANADA

Injured : 0 Dead : 0

Abstract

Fifty two of a sixty four crew aboard a jack-up drilling rig were evacuated by a lifeboat with the twelve men remaining on board, following a dangerous build-up of pressure.

An exploration well was being drilled when the pressure increase was observed activating the blowout preventer.

A second rig was brought in to attempt to relieve pressure by drilling another hole. The well was still not successfully capped on 16 December 1985.

[high pressure, near miss, evacuation, offshore, natural gas]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1986, FEB.

Location : West Virginia, USA

Injured : 0 Dead : 0

Abstract

A road transportation incident. The driver of a road trailer felt the load shift a little and an emergency crew foreman following behind in an escort van saw sparks emerging from beneath the trailer. He told the truck driver about the problem over their two way radio so the truck driver was able to stop and subsequently back his vehicle onto an access ramp where the vehicle and its load were cordoned off.

Examination showed that a 14 inch long crack had opened up one side of the trailer close to the goosneck. This had allowed the trailer to contact the ground but the unit had remained attached to the tractor through the firth wheel. No leakage of methyl isocyanate (MIC) occurred.

[transport effects, near miss]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 139, 4-5.

Location : ,

Injured : 0 Dead : 0

Abstract

A full keg of AZDN (azodi-isobutyronitrite, AIBN) was mistakenly loaded into a 'warm box' along with kegs of another material normally stored at 40-50 degrees C. This mistake was compounded by partial failure of the temperature controller which allowed the temperature to reach 60 degrees C for several hours. The keg of AZDN decomposed after about 36 hours, as would be expected. The keg was charred but there was no fire.

[loading, human causes, decomposition, near miss, container]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A dangerous occurrence. A failure on a lift in a compounding area occurred. The cable connecting the lift to the counterweight failed, slipping through the clamps. No one was injured.

[mechanical equipment failure, mechanical handling equipment, near miss]

Lessons

[None Reported]

9127 25 June 1985

Source : LLOYDS LIST, 1985, JUN, 25.

Location : California, USA

Injured : 0 **Dead** : 0

Abstract

Radioactive water leaked from a pipe connected to a steam generator inside a nuclear power plant. Fortunately this was contained inside the reactor building.
[reactors and reaction equipment, near miss]

Lessons

[None Reported]

9202 11 June 1985

Source : THE GUARDIAN, 1985, JUNE, 12.

Location : Gloucestershire, UK

Injured : 27 **Dead** : 0

Abstract

A road transportation incident. A school bus collided with a lorry carrying ammonia. Neither the coach or the tanker driver was injured and there was no ammonia spillage.

[collision, near miss, injury]

Lessons

[None Reported]

1157011 April 1985

Source : ICHEME

Location : , NORTH SEA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. An oil tanker laden with 70,000 tonnes of crude oil, ran aground on sand and mud banks. Fire-fighting vessels and tugs were dispatched by authorities fearing an oil-spill.

The vessel was refloated the following day and berthed at a port without further incident.

[ship ran aground, near miss]

Lessons

[None Reported]

1124226 January 1985

Source : THE GUARDIAN, 21 FEB, 1985, 19 APR, 1985.

Location : , UK

Injured : 0 Dead : 0

Abstract

Routine air monitoring at the beryllium workshop of a factory revealed the presence of airborne particles of the substance. Some parts of the workshop were also found to be contaminated with beryllium powder. The facility was closed and medical examinations were carried out on staff. No ill-effects were found and all were allowed to return to normal work. The building is kept under negative pressure and all ventilation air is discharged through filters so contamination of the outside environment was unlikely. Beryllium is toxic and carcinogenic. Some man-made isotopes are radio-active.

[gas / vapour release, near miss, laboratory work, radioactive isotopes]

Lessons

[None Reported]

Source : ICHEME

Location : , BELGIUM

Injured : 0 Dead : 0

Abstract

The front crosshead pin through bolt of the second stage of an ethylene hypercompressor failed due to fatigue. Both front feed cylinders were fractured causing an ethylene leak. The system was shutdown and the ethylene leak diverted to the reactor enclosure without ignition. The cause of the failure was attributed to a number of maintenance items.

[material of construction failure, gas / vapour release, reactors and reaction equipment, maintenance inadequate, near miss]

Lessons

[None Reported]

Source : SEDGWICK LOSS CONTROL NEWSLETTER

Location : Offshore, SPAIN

Injured : 0 **Dead :** 0

Abstract

Transportation. Anchor wire of vessel fouled offshore oil pipeline which was bent to an angle of 120 degrees.

[marine vessel snagged pipeline, near miss]

Lessons

[None Reported]

1112705 October 1984

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

Failure of a hoist rope on an electric travelling hoist. The hoist was used to lift a tray that weighed 0.15 tonne and was loaded with 0.35 tonne of resin at the time of the incident. As an operator was raising the hoist and it was a few feet from the ground, the rope broke suddenly causing the full tray to fall. In falling it narrowly missed the operator.

The fault was caused by the rope becoming displaced from the pulley and slipping between the sheaf and the side plate. In doing so, this caused the rope to fray.

The only means by which the wire rope could become displaced was if the rope was not kept under tension.

[lifting equipment, mechanical equipment failure, near miss]

Lessons

[None Reported]

1163201 October 1984

Source : ICHEME

Location : , BERMUDA

Injured : 0 Dead : 0

Abstract

A marine transportation incident. A marine tanker laden with 196,000 tonnes of crude oil hit a reef just North of Bermuda. Fortunately the vessel remained intact and an ecological disaster was averted. She had missed nearby sharp coral heads and come to rest on a relatively smooth ledge some 65 feet down. Nine days later the vessel was floated free.

[near miss, unidentified cause]

Lessons

[None Reported]

1141424 August 1984

Source : ICHEME

Location : , OFFSHORE, CANADA

Injured : 0 **Dead :** 0

Abstract

A loss of drilling fluids during gas drilling operations from a jack-up rig caused a precautionary evacuation of 21 non essential personnel. Forty four essential crew remained on board.

[offshore, near miss, natural gas]

Lessons

Fluids are pumped into the drill hole above the bit, and their pressure prevents any natural gas in the hole from blowing out.

3033 20 June 1984

Source : EVENING ECHO, 1984, 21 JUN.

Location : Rayleigh; Essex, UK

Injured : 0 **Dead** : 0

Abstract

A storage tank of hydrochloric acid developed a large crack and was emptied before a spillage occurred.

[near miss, storage tanks]

Lessons

[None Reported]

Source : LLOYDS LIST.

Location : , CANADA, OFFSHORE

Injured : 0 Dead : 1

Abstract

A semi-submersible offshore drilling rig experienced a gas blow out off the eastern coast of Canada. No explosion occurred and the authorities implemented a 10 mile exclusion zone in order to minimise the risk of ignition. Later examination revealed damage to the drilling floor. All 76 crew members evacuated successfully into life rafts and were picked up by ships. One crew member later died from a heart attack following a night in the raft. High winds allowed gas to be dispersed and condensate was also dispersed by wave action. The well was capped two weeks later by a team of experts using synthetic mud pumped down the well.

[evacuation, near miss, fatality, blowout, natural gas]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A forklift truck punctured a 45 gallon drum of methanol, the drum was sealed and made safe.

Three days later recovery and disposal of the drum was carried out.

[drums, near miss]

Lessons

[None Reported]

123011984

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An incident occurred during maintenance on a heat exchanger. Two fitters were sprayed with oil whilst removing three tubes from a vertical fixed tube sheet reboiler for inspection. Fortunately, neither of the fitters was injured.

An investigation discovered that the shell side of the exchanger had been left under nitrogen pressure.

[near miss, safety procedures inadequate]

Lessons

The following recommendations were stated in the report:

The condition of equipment must be checked before a clearance certificate is issued.

A check on the exchanger would have revealed that it was still under pressure.

Fitters carrying out the work must follow all safety precautions specified on a safety certificate.

This is particularly important in plants handling highly toxic material such as phenol.

9165 15 November 1983

Source : THE STANDARD, 1983, NOV, 15. THE TIME, 1983, NOV, 16.

Location : M6, UK

Injured : 1 **Dead :** 0

Abstract

A road transportation incident. A nuclear fuel transporter was damaged in a motorway crash. The vehicle had just delivered a load of spent nuclear fuel. The container was found to be undamaged after the crash and there was no danger of a radiation leak.

The transporters trailer was damaged and the driver of the articulated lorry which was also involved in the accident, was treated for slight injuries.

The trailer carrying the massive flask, built of steel 14 inches thick, was being towed by a diesel tractor on the north-bound carriageway.

[collision, near miss, injury]

Lessons

[None Reported]

9125 08 October 1983

Source : LLOYDS LIST, 1983, 13, OCT. 1983, OCT, 14.

Location : Angra, BRAZIL

Injured : 0 Dead : 0

Abstract

A defective valve released a small amount of radioactive steam. Fortunately the incident did not release any radioactivity into the environment. At the time of the incident the reactor was running at only 1% of full power when it was shut-down.

[reactors and reaction equipment, near miss]

Lessons

[None Reported]

Source : ICHEME.; SIZING PRESSURE VACUUM VALVES FOR CONE ROOF TANKS, LOSS PREVENTION BULLETIN, 072, 1-5.

Location : , GERMANY

Injured : 0 Dead : 0

Abstract

In the evening there was a violent storm when an operator noticed that there was appreciable deformation of the second ring from the top of an 12,000 m³ cone roofed ethyl alcohol tank. It was noted that denting of about 500 mm had occurred. He started up a flow of 400 Nm³/h inflow of nitrogen and within 2 minutes the deformation sprang out. There was less than 1 metre depth of ethyl alcohol in the tank. The tank was 36 metres in diameter and 12 metres high. The design pressure was atmospheric, test pressure 24.5 mbar and test vacuum 5 mbar. The design inflow and outflow rates are 250 m³/h. The tank was fitted with 5 PV valves with flame arresters(150mm) on 150mm pipes set at -5mbar and +22 mbar. The valve throughput rates were 1750m³/h at +24.5 and -8mbar.

[storage, storage tanks, human causes, near miss]

Lessons

Calculations of breathing rates for API 2000 and DIN 4119 were made when cooling takes place.

The API 2000 rate was based on spraying tests carried out on a hot summers day showing a temperature drop of 15 degrees C for the sheet roof and 1 degrees C for the sheet rings. These figures corresponded to a heat exchange of 54 kcal/h/m².

Tank spraying tests confirmed the API results. The initial temperature of the gas phase was only 35 degrees C and the sprayed water 18 degrees C.

Restatement of results for a 13,000 m³ tank:-

| | |
|----------|-------------------------|
| API 2000 | 1,830 m ³ /h |
| DIN4119 | 4,600 m ³ /h |
| | 5,500 m ³ /h |

It was established that the API code is not sufficiently rigorous with regard to the dimensioning of vacuum valves on tanks.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An incident occurred involving a railway maintenance contractor. Contractor's personnel had arrived on the site two days earlier and had immediately commenced a job which was pre-planned and fully covered by work permits. Having completed this work they then moved to a second job without first obtaining the relevant Work Permits.

The second job involved renewal of foundations to a length of railway track. A JCB excavator was used to remove the old foundations and in the course of this work the machine inadvertently cut through an electricity board 11KV power cable. The excavator driver escaped without injury, but he is considered very fortunate to have done so.

[excavation damage, near miss, contractor error]

Lessons

[None Reported]

1161915 March 1983

Source : THE GUARDIAN, 25 MAY, 1983.

Location : , NORTH SEA

Injured : 0 Dead : 0

Abstract

A mobile rig was drilling a development well when a subsea gas leak occurred, fortunately the leak did not ignite. The rig was partially evacuated.

Shipping was requested to remain at least two miles distance from the rig.

The leak was lugged 10 day after the leak began by pumping seawater down a pipe driven 10,000 ft. into the existing well. Plugging operations were delayed because there was not enough wind to disperse leaking gas from around the platform.

[offshore, evacuation, near miss, gas / vapour release]

Lessons

Watch to be maintained to observe for subsea leaks.

Early detection can help prevent ignition.

Stemming leaks connected to subsea reservoirs may take an extended period.

Safe dispersion of gas leaks is dependent on wind and atmospheric conditions.

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

An incident occurred on a power station furnace area. An operator was checking a jet burner and on touching the handle on the centre tube it flew out. Fortunately the hoses supplying the steam and fuel oil to the centre tube section prevented it from clearing the outer burner body. The system has an ultra violet flame sensor which shuts off the fuel oil supply valve and as it closes it introduces steam into the system. A small amount of fuel oil/steam was discharged when it blew back past the gland section.

Close inspection of the burner revealed that the threads on the centre tube, which holds it in position at the nozzle, were worn and allowed the tube to part from the nozzle.

All burners were checked and another five were found to have worn threads and were withdrawn from service.

[near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A road transportation incident. An LPG road tanker attempted to pass under a bridge of restricted height. While the driver stopped and checked to ensure that he could pass he failed to take into account the accessories projecting at the upper end of the tank, a ladder and slip-tube gauges. As a result the gauge flanges were broken and a small quantity of LPG vapour escape. The tanker was almost empty and there was, therefore, no real danger from this leakage but, if the tank had been full, the danger would have been substantially increased due to the leakage of liquefied gas.

[Near miss, human causes]

Lessons

[None Reported]

1280915 December 1982

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A rail transportation incident. A cloud of white vapour escaped from the valve of a container onboard the train. The train was immediately pulled into a siding and emergency services were called.

The container was separated from the rest of the train and isolated in the siding. All rail services were re-routed.

The liquid gas froze on contact with the air as it escaped causing the container to be covered with a sheet of ice reducing the possibility of an explosion.

Strong winds quickly dispersed the vapour that did escape.

Eventually the faulty valve was freed and resealed.

[gas / vapour release, near miss, valve failure]

Lessons

[None Reported]

9167 04 November 1982

Source : THE TIMES, 1982, NOV, 4.

Location : Karlsruhe, GERMANY

Injured : 2 Dead : 1

Abstract

A road transportation incident. A missile transporter crashed into four cars. Fortunately, the transporter was not carrying a warhead at the time of the crash and was not damaged.

1,200 villagers were evacuated and 250 people nearby due to the risk of an explosion from inflammable propellant on the transporter.

The 20 tonne missile transporter careered out of control due to an apparent brake failure.

[brakes faulty, collision, evacuation, near miss, fatality]

Lessons

[None Reported]

Source : C&EN 11, OCT, 1982, LLOYDS LIST 7, OCT, 1982.

Location : , USA

Injured : 0 Dead : 0

Abstract

Extortion Threat. Bombs placed in ethylene plant.

The management of a large petrochemical complex, producing ethylene, propylene and derivatives was confronted with an ultimatum that their facility would be blown up unless \$15 million (1982) were paid in cash.

The letter claimed that 10 bombs were planted on the site.

The plant was shut down. After shut-down only a small number of people remained on-site for security and maintenance work. Police took precautions to prevent bombs being triggered by radio transmissions or by motions.

Of the five bombs found four were defused and the other exploded. The remainder were apparently not placed. No one was injured and there was no damage to the plant.

Total cost to the company was between \$4-5 million (1982), of which \$1.5 million (1982) was start-up and shut-down cost, the remainder being lost production over a week and a half.

[deliberate acts, near miss, processing, product loss]

Lessons

1. Management to consider the nature of threats to operations and installations stemming from outside sources.
 2. Plant security to be reviewed in the light of potential outside hazards.
 3. Procedures to be established for Company response in the event of outside threats of a criminal nature.
-

1279907 July 1982

Source : HAZARDOUS MATERIAL INTELLIGENCE REPORT, 16 JULY 1982.

Location : Ohio, USA

Injured : 0 **Dead** : 0

Abstract

A rail transportation incident. Twenty-four tank cars on a train including one carrying 200,000 pound of butadiene derailed as a result of a wheel bearing failure. A nearby residential area was evacuated as a result.

The car was righted and fortunately no leak occurred.

[derailment - consequence, rail incidents, near miss, evacuation]

Lessons

[None Reported]

1294817 May 1982

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A near miss incident occurred at a chemical plant when a batch of methoxycitronellene epoxide was dumped after boil off. Fortunately no one was injured and no damage occurred to equipment.

Approximately £3000 (1982) in raw materials was lost to drain.

An investigation into the cause of the incident found that cooling water never reached the reactor.

[processing, process causes, reactors and reaction equipment]

Lessons

[None Reported]

9415 22 October 1981

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

Operational problems were experienced on a post fractionator column and the tower was taken off line for inspection. Examination of the tower revealed collapse had occurred to the odd number trays, No. 89 to 55 of 90 tray tower. To ease the removal of these trays, the centre section of the even numbered trays was removed down to tray 56.

The tray parts were removed from the tower via the top mandoor, which is approximately 180 feet above ground level. The initial winch set-up to lower the tray section to ground was considered unsatisfactory by the rigging engineer and an alternative method using a hired mobile high lift crane and cage was adopted. The lifting cage was used for transporting personnel and tray sections to the top and middle mandoor of the tower. Use of the cage by personnel was on a voluntary basis (as an alternative to using the cat ladders on this high tower).

The crane was set up and work commenced. All damaged tray sections were removed, repaired and replaced.

A few days later when two men were being lowered from the middle pick-up point, the cage caught a protruding metal bracket, tilted and damaged one of the tie bars before any corrective action could be taken.

No injuries to personnel resulted from this incident but an enquiry was initiated.

There is no serious safety problem associated with the use of a high lift crane and cage provided qualified personnel, proper equipment and the proposed instructions are followed.

[damage to equipment, near miss]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 054, 30,; GUARDIAN, 25 JULY, 1981,; THE TIMES,25 JULY, 1981,; THE TELEGRAPH, 25 JULY, 1981;
HAZARDOUS CARGO BULLETIN, AUGUST 1981 (VOL 2 NO 8); HAZARDOUS MATERIALS INTELLIGENCE REPORT. (DATE NOT SUPPLIED)

Location : Sussex, UK

Injured : 0 **Dead** : 0

Abstract

A marine transportation incident. A 3,100 dwt cargo ship left port with a mixed load of cargo in her single hold. Part of the cargo involved 856 200-litre steel drums of toluene, 227 drums of diethanolamine, and 295 drums of methyl ethyl ketone. Stowage was reported to be in accordance with IMDG Codes. Shortly after leaving harbour, the vessel's crew became aware of a strong solvent-like smell, but did not open the electrically operated hatchcovers for fear of explosion. The ship's master radioed for advice and assistance, and the vessel was diverted to that port, where a remote berth had been arranged with the emergency services in readiness.

The area around the berth was evacuated to a radius of half a mile, before the emergency services began to purge the hold with nitrogen. After the gasification and injection into the hold of approx.12 tonnes of liquid nitrogen, and after explosimeter readings showed concentrations below LFL, the hatch covers were removed and firefighters wearing protective clothing removed the damaged and leaking drums. The cause of the leaks were not ascertained. The persons evacuated were allowed to return after 7 hours.

[near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

Approximately 13,000 pounds of ethylene oxide was released to atmosphere by a pressure relief valve that failed to reseal after activation by a hydraulic hammer in the oxide line.

This caused a severe vapour cloud hazard on a warm and sunny day that, fortunately, was dissipated without further incident.

A new ethylene oxide plant wide distribution header was recently installed, with one of the key objectives being to eliminate hazards associated with the oxide inventories contained in storage/feed tanks, by allowing feed to be fed to the reactors directly from the distribution header.

[safety relief valve failure, safety relief valve, ethylene oxide, gas / vapour release, near miss]

Lessons

It was discovered that the relief valve failed because weld metal, from the modification, was found under the seat of the valve. Two changes were made to prevent recurrence:

1. The oxide feed control valves were modified to permit only 90% closure 'instantaneously', with 100% closure following at a programmed rate.
 2. The discharge of the relief valve was directed to an enclosed vessel equipped to handle such discharges.
-

9410 13 May 1981

Source : ICHEME

Location : , UK

Injured : 1 Dead : 0

Abstract

A contractor was assisted from a sand filter he had been inside emptying using a vacuum hose. He was taken to the medical centre arriving there in a state nearing collapse. He recovered in the centre and was taken home by one of his colleagues.

[entry into confined space, near miss]

Lessons

[None Reported]

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

Abstract

An instrument mechanic was trying to free a stuck sphere inside the pig chamber of a meter prover using air pressure instead of securing the pig chamber door properly with bolts through the fixed lugs, he decided to insert a valve wheel key into the top lugs and leave the bottom lugs unsecured.

The pivot arm on the chamber door had been removed at an earlier date because new brackets for holding hoses had been welded to the chassis and the modification prevented the door from being opened fully if the hinge was permanently attached.

The first attempt to dislodge the sphere which was approximately 2m away from the chamber opening failed. It was at the second attempt when it was likely that the air pressure reached 100 psig that the ball was suddenly released. The pig chamber door blew off and ejected the sphere and shock absorber with considerable force. The chamber cover and shock absorber came to rest approximately 20 m away and the ball travelled a total distance of 230 m after hitting various obstacles in its path.

It was fortunate that no-one was hurt because several people were in the vicinity at the time of the incident. Two women cleaners nearby narrowly escaped injury.

[modification, maintenance, near miss]

Lessons

The report stated the following recommendations:

1. Pivot arm/hinge holding the door to the chamber as originally designed to be replaced. Stringent control of modifications to plant and equipment to be re-emphasised.
 2. Permanent warning and instruction notices to be secured to all pig chambers.
 3. Meter prover operations to be closely supervised.
 4. The possibility of removing human error from this type of operation to be investigated whereby the cover must be securely fixed before the system will operate.
-

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

A chemical process employed a vertical shell and tube reactor, with molten salt in the shell and reactants in the tubes. The reactor was being modified, when it was noticed that the shell was bulging. Further investigation showed that two tubes in the reactor had burst. These were tubes which had been found to be leaking in a previous overhaul and had been plugged top and bottom.

The calculated burst pressure of the tubes was 3800 psig (roughly 260 bar gauge). It was surmised that the bursting of the tubes produced a shock wave which was transmitted through the salt and caused the shell to bulge.

When the tubes were plugged, a hole had been drilled through the tube wall near the top plug in order to relieve any build-up of pressure. However, it was found that there were substantial plugs of catalyst and carbonate in the tubes between the burst and the relief hole.

It was concluded that water had been trapped in the tubes behind the catalyst/carbonate plugs, rendering the pressure relief hole ineffective. On re-commissioning the reactor, the water vaporised, and at the high temperatures within the reactor sufficient pressure was generated to rupture the tubes.

[maintenance, repair, modification, heat exchanger, shell and tube heat exchanger, reactor tube, near miss, explosion, overpressure, overpressurisation, solids deposition, cleaning inadequate, reactors and reaction equipment]

Lessons

When leaking tubes in heat exchangers or reactors are plugged at either one or both ends, it is essential to thoroughly clean the tubes by water jetting or drilling before plugs are inserted and vent holes drilled.

Source : LLOYDS LIST, OCT 10, 1980.

Location : Frankenthal West, GERMANY

Injured : 0 **Dead** : 0

Abstract

Drilling was in progress to create a new underground storage cavity for natural gas when an existing pressurised cavity was breached. Technicians attempted to pump water into the drill hole to prevent the escape of gas, but this was unsuccessful. Gas leaked through the drill pipes and escaped to atmosphere, causing a significant explosion risk. 7 million cubic metres of gas were lost, valued at 3 million Deutsche Marks (1980). The drill pipes were eventually capped.

[excavation, gas / vapour release, near miss, natural gas, operation inadequate]

Lessons

Precise controls are required when drilling in the vicinity of existing cavities, especially when they contain pressurised hazardous materials.

Source : ICHEME

Location : , USA

Injured : 1 Dead : 0

Abstract

A near miss incident involving an internal floating roof tank.

A gasoline blend tank was taken out of service for repair of a sunken, pontoon-type aluminum internal floating roof. Inspection revealed massive failure of the roof, due to caustic corrosion attack. Many pontoons were corroded through, but some appeared intact. Three contractor's employees inside the tank began removing the damaged roof using shovels to rip the sheet metal from the support ribs. A fire occurred inside the tank, apparently due to liquid leaking from a pontoon and igniting when a shovel struck metal. The employees escaped from the tank, one sustaining minor injury. The fire was contained within the tank and caused minimal damage. The foreman had smelled gasoline vapours several minutes before the fire occurred, but did not shut the job down.

[mechanical spark, maintenance procedure error, fire - consequence, corrosion, storage, shoval, injury]

Lessons

Conclusions:

1. The contractor supervisor did not terminate activity when hydrocarbon vapours were suspected to be in the tank.
2. The apparent source of ignition was a steel shovel creating a spark which ignited the vapours.
3. No effort was made to inspect all of the pontoons for possible containment of hydrocarbons. One or more pontoons contained gasoline. Provision must be made to remove all the hydrocarbon from within a tank before work can be done safely.

Recommendations:

1. To formulate a comprehensive set of procedures to deal with maintenance in a tank with a pontoon-type roof.
 2. In the interim, until procedures are finalized, to remove all pontoons from a tank by unbolting them, one at a time, and checking for containment of hydrocarbons. If a pontoon contains hydrocarbons, it will be removed from the tank before further work is started.
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A road transportation incident. A tank truck carrying 9000 gallons of LPG (liquefied propane gas) began leaking through a pressure relief valve while travelling over a bridge. The driver learned of the leak by radio from another trucker on the bridge and continued across the bridge to an exit ramp where he stopped the vehicle.

The fire department arrived quickly and stopped traffic on the 2 level bridge for about 6 hours, while response personnel worked to cap the leak and to prevent the tank and the leaking gas from igniting and exploding.

[near miss]

Lessons

[None Reported]

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

Abstract

Incident on pilot plant reactor. An apparently normal start-up reached full feed rated for thirty minutes when the exit gas meters were noticed to be slowing down. The research operator informed the assistant chemist. Within one minutes fumes were noticed coming out of the top of the reactor case and the reactor pressure began to fall. The emergency switch was operated, turning off all heat and reactor feeds. The fire alarm was sounded and the fire brigade were called. No flames were seen, however the contents of a carbon dioxide extinguisher were discharged into the area around the top of the reactor. After five minutes of the first sign of fumes, the fumes began to subside, finally ceasing after about thirty minutes. The fire brigade were not required to do anything other than stand by, and eventually refill the extinguisher. The reactor cooled back overnight and was dismantled the following day.

The following conclusions were made:

1. The incident was caused by an exotherm in the top of the catalyst bed. The exotherm was caused by high propylene and ammonia feed rates into a bed which had a high catalyst to diluent ratio.
2. The high propylene and ammonia feed rates were caused by an operating error which should have been noticed and rectified before the incident could have occurred.

[reactors and reaction equipment, unwanted chemical reaction, operation inadequate, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

An incident occurred during maintenance work involving a caustic head tank level controller, when the protective lead plug became displaced from the radioactive source.

The radioactive source was unplugged and unprotected for between 24 to 48 hours, it is fortunate that the source was so weak that it caused no harm to personnel exposed to the radioactivity during this time.

The following conclusion was made:

The removal and replacement of the radioactive source during the maintenance job was carried out without due regard to the conditions laid down in the Certificate of Registration. This resulted from lack of written operating and maintenance procedures and failed to appreciate the procedures required due to inadequate training of those involved in the incident.

[protective safety equipment, design or procedure error, spill, near miss, training inadequate]

Lessons

[None Reported]

1955 January 1980

Source : HAZARDOUS CARGO BULLETIN, 1980, MAR.

Location : Buckeye; Arizona, USA

Injured : 0 **Dead** : 0

Abstract

A rail transportation derailment. 900 people evacuated when 6 cars derailed including 2 rail tankers containing propane. There was no leakage. Near miss. [evacuation]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 1 **Dead :** 0

Abstract

A welder was working within a road tanker. Air for breathing was supplied by a fan. For the noon break the man switched off the fan and left his welding gun with argon supply inside the tanker. When he came back to resume work he fell unconscious almost immediately, but fortunately he was rescued.

[maintenance, contamination, near miss, atmosphere not tested, entry into confined space, injury]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An o-xylene splitter column had been scaffolded over its entire height [in excess of 250 feet (76 m)] to allow the column to be painted. Scaffolding was erected while the unit was running with the temperature of the column at approximately 465 degrees F (240 degrees C).

The Unit was shut-down over a weekend and after the column temperature had cooled to ambient it was observed that column contraction had been sufficient to affect the scaffold. Standards (vertical supporting tube members) which were resting on column platforms were noted to be 2-3 inches clear of the platforms, and ledgers (tubes spanning horizontally and tying a scaffold longitudinally) on one side of the scaffold were showing a downward deflection also of 2-3 inches.

The scaffold was constructed on all sides of the column and this, along with the request from the refinery Scaffolding Inspector for 7ft. spacing between standards instead of the intended 9ft., provided sufficient support to prevent any major instability which might otherwise have resulted in an accident.

[near miss]

Lessons

1. The expansion of tall vessels at high operating temperatures must be taken into account prior to de-commissioning.
 2. Contraction effects should be taken into consideration when any major pre-shutdown scaffolding is undertaken.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

The hook of a mobile crane failed when the crane attempted to lift a small box heater weighing approximately 15 tonnes. Fortunately, the heater had not been raised from its supports when the failure occurred and no one was injured. There was no damage to property.

The failure was due to corrosion of the threads on both the hook and nut of the assembly, resulting in the hook being pulled from the block when sufficient weight was applied.

After the investigation it was found that: The threads on the hook and on the nut were badly corroded and the only piece that had been holding the two parts together was a 3/8 inch diameter pin, inserted through the nut and hook to prevent the nut from turning. The corrosion was probably caused by exposure to moisture over an extended period of time.

The contractor stated that the problem with the hook had been noticed by one of his crane operators some time previously, and that he had taken it into his workshop and instructed the mechanic to repair it. However, he admitted that he had not followed up on it, and that someone had taken it out of the shop and placed it on the crane, unaware of the defect.

[human causes, near miss, operational activities]

Lessons

The following points should be checked before lifting plant is permitted on site:

1. Check that valid crane test and insurance inspection certificates are available.
2. Check that test and inspection certificates are available for all "loose" items, including hook blocks, ropes, slings, shackles, etc.
3. Examine condition of such items on site and check that rope terminations are in accordance with good practice.
4. Inspect the machine's general condition; if it looks shabby then items that cannot be readily seen may be in a poor condition.
5. Check with the Contractor that the safe load indicator and all other safety devices are functioning correctly.
6. Check the condition of tyres if wheel mounted.
7. Check that ropes are spooling correctly on the drums - refuse acceptance if rope is piled-up towards one drum flange.
8. Check that the crane hook is fitted with safety latch.
9. Check for loose items such as bolts, washers, etc. in the driver's compartment - these items have often become wedged under brake pedals and prevented effective operation.

Although the list appears lengthy, it should only take a competent person about 15 minutes to complete.

Source : ICHEME

Location : ,

Injured : 1 Dead : 0

Abstract

A heavily fouled heat exchanger tube bundle was being cleaned by a specialist contractor using a water/sand mixture at a jet pressure of 400 atmospheres. The spray gun was held under the right arm and guided with the left hand. The discharge valve lever was operated by the right hand. The contractor got his protective glove caught between the valve lever and the top of the gun when he released it. At that moment with the jet not shut off, the contractor was forced by the counter pressure to turn through an angle of 180 degrees and stumbled; the jet hit him on the upper part of the right thigh. The contractor was seriously injured and remained off work for many months.

The area was surrounded with sheet steel screens which prevented the jet from hitting other personnel.

[cleaning, operator error, near miss, injury]

Lessons

High pressure jetting is potentially very dangerous. Facilities should be safe by design and operators should not do this type of work alone.

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A fixed foam installation designed to put out rim fires on a floating roof tank was installed. To confirm that the foam would spread all round the rim a live test was felt necessary. It actual fact no foam reached the rim because frangible discs had been supplied for the foam outlets which did not break at pressures applied by the foam system he had supplied.

[testing, fire fighting equipment, near miss, incorrect equipment installed]

Lessons

Apparatus such as safety equipment which may not be called on to operate for many years must be thoroughly tested in commissioning and checked over on a regular basis.

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A sheet metal worker still has his sight because he was wearing a pair of safety spectacles. The man was using a portable grinder when a piece of metal suddenly broke away and struck the right lens of the glasses with considerable force. Although both lenses were shattered, they remained intact within the frames.

[personal protective equipment, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 1 **Dead :** 0

Abstract

A fitter was saved from almost certain death because he was wearing his safety helmet. He was working in a domed tank at a chemical plant when a rigger accidentally dropped a shackle and eyebolt weighing about 7 kg through an opening in the roof of the tank. The fitter was working on scaffolding above the bottom of the tank and below an opening. The force of the blow sent him sprawling onto his stomach on the scaffold. His neck was badly jarred and he was dazed but he was still alive.

[personal protective equipment, near miss]

Lessons

[None Reported]

1979 29 October 1979

Source : ICHEME

Location : , BELGIUM

Injured : 0 Dead : 0

Abstract

There was a blow out of the spindle from a ball valve during the normal valve operation to change over filters. The spindle was ejected some 5 metres. Emergency plant shut down was initiated, and there was a major release of ethylene that was controlled by the sprinkler system.
[plant shutdown, gas / vapour release, valve operation, seal failure, testing inadequate, near miss]

Lessons

Testing inadequate was considered to be the cause, as the inner seal failure could not be detected by the standard pressure test. The safety features averted a vapour cloud explosion and thus this is considered to be a near miss.

1244013 August 1979

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

Fumes were detected by a process operator on a plant. The operator went to investigate the tank top temperature indicators and found them to be at -6 degrees C.

On reaching the compressor house he discovered quantities of liquid on the roof and fumes rising from the 24-inch bursting disc turret of the storage tank. Realising a major incident could occur the operator raised the alarm.

The fire brigade were informed and arrived soon after.

Hoses were used to flood the tank through the top turret providing a 'heat sink', and to eventually float out the contents with minimal contamination.

As the two hoses were placed at the top of the turret it was noted that the water addition rate would be restricted due to mesh supporting the polythene film-bursting disc, which required the hoses to rest at a shallow angle within the turret.

At this stage the temperature in the tank bottom (presumably water) was approximately 25 degrees C, but the fume emission had subsided.

During the next half an hour the tank bottom manhole temperature became much hotter (approximately 50-60 degrees C) as the tank level increased. All personnel were called off the tank top, as there was now a possibility that the liquid could be ejected as the tank ullage reduced to zero.

Approximately two hours later the tank was overflowing without incident and personnel were informed that the emergency was over.

[storage tanks, gas / vapour release, near miss, process causes, n-butyl perdicarbonate]

Lessons

[None Reported]

9980 16 May 1979

Source : ICHEME

Location : , BELGIUM

Injured : 0 Dead : 0

Abstract

As a result of operator error, the valve operation to isolate a measuring tank from a batch reactor was not carried out. Consequently a back flow of a mixture of nitrogen and propylene oxide was released to atmosphere through the overpressure relief valve on the measuring tank, causing an environmental incident. [reactors and reaction equipment, gas / vapour release, valve operation, near miss]

Lessons

Further investigation concluded that if a reacting mixture had been back fed to the tank then an uncontrolled reaction resulting in an explosion could have occurred. This was a near miss with the potential to have been a vapour cloud explosion, and a detailed investigation was to be undertaken.

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

During a full pressure hydrostatic test at 420 psig, a thimble which had been expanded into the rear steam drum on a boiler was ejected. Two thimbles had been fitted to replace a cross-over tube and installed with the thimbles facing into the steam/water space, a departure from previous practice. This was done because of internal fouling of thimbles fitted in the usual manner, where they form pockets in the steam water space. Due to inexperience and a failure in communication, the thimbles were inadequately expanded and not provided with a beading or any projection.

[testing, steam, operational activities, inspection, boiler, expanded thimble, near miss, modification procedures inadequate]

Lessons

The following recommendations were made:

1. The need for recognition and formal treatment of modifications must be emphasised.
 2. Where plugs rely on a friction or other mechanical fit, i.e. non-welded, special precautions should be defined for hydrotesting.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A tank farm operator reported an arc of light (corona) around a handrail and instrument housing during a short hail storm while a sample was being taken from a floating roof kerosene tank.

The floating roof tank was fitted with shunts, electrically bonded at the top and bottom of the rolling ladder and fitted externally with earthing straps. The electrical continuity of these facilities was later checked and found to be satisfactory.

At the time of the incident, the operator was standing on the dipping platform taking a sample cage suspended on natural fibre (not synthetic) cord. The tank was full and had been standing 18 hours without movement. As soon as the operator touched the handrail, the visual corona disappeared.

[corona, near miss, electrically charged, hail, floating roof tank, weather effects]

Lessons

The type of hail which occurs with Force 5 winds is known as 'soft hail' or 'Graupel' and is electrically charged. It is possible to charge paint electrically by impact from the hail stones and electrification might also occur by hail stones bouncing off the surface of the tank. If the paint resistance is high (especially polyurethane paint), it can become electrically charged and under some conditions visual corona can occur.

Sampling or dipping should not be undertaken during electrical or hail storms and, if already in hand, should be stopped immediately and the operator should leave the dipping platform as quickly as possible closing all tank openings.

When material which forms a flammable vapour is stored in fixed roof tanks then efforts should be directed towards minimising the frequency of tasks undertaken on tank roofs, and consideration given to installing automatic gauging facilities.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Whilst patrolling the basement of a building an employee heard a hissing sound from an adjacent room. He alarmed the foreman, who found that the safety valve in the main nitrogen line was blowing off. He stopped all processes using nitrogen and alarmed the fire brigade. The firemen, protected by self contained breathing sets, closed the main nitrogen supply valve and took an oxygen reading, which showed a concentration of only 17%. The basement was thoroughly ventilated and access allowed only after normal oxygen concentration had been restored.

The cause was found to be a defective safety relief valve.

[near miss, safety relief valve failure, design inadequate, gas / vapour release, nitrogen]

Lessons

Relief lines of safety valves for asphyxiating (or other dangerous gases) must not end in a closed room, they must always vent to a safe area.

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

On the 2nd September 1978 in the polyethylene finishing building, it came to light that the following a request for electrical isolation of a screw conveyor, another screw conveyor had been isolated instead. By the time the mistake was discovered, fitters had begun working on the non-isolated conveyor. No-one was injured and the incident was reported as a near-miss.

The cause of the incident was the confusion arising from inadequate identification of equipment with plant item numbers and also poor marking of the electrical equipment used for electrical isolation.

[operation inadequate, isolation inadequate, near miss]

Lessons

Following the incident the following recommendations were made:

1. Items of equipment which have plant item numbers should be clearly marked with them in a permanent manner.
 2. Stop/start buttons for machines and the electrical equipment used to isolate those machines should be clearly identified with the machine plant item number.
 3. When hand over certificates are issued they must fully specify the plant item number of the equipment on which the work is to be done.
 4. In the building piece-meal expansion had led to illogical allocation of plant item numbers. A chart should be displayed in the building showing the principal plant items with their plant item numbers.
 5. Training and communication exercises should be carried out to encourage all personnel to follow the practice of. Before work is started on any equipment which is supposed to be electrically isolated the operating personnel should confirm the isolation by pressing the local start button.
-

9218 31 July 1978

Source : LIVERPOOL POST & ECHO, 1978, JUL, 31.

Location : , UK

Injured : 0 Dead : 0

Abstract

Firemen were called to a railway station when an ammonia gas tanker was found leaking. There was no danger.
[near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A palletised stack of active carbon was observed to have reached an elevated temperature and smoke was seen. The incident was dealt with by the works fire team. The investigation showed:

1. The cause was the initiation of a self-heating process within the carbon mass.
2. There had been a change in the packaging technique but not in the manufacturing technique. This change allowed an increase in temperature of the carbon due to the 'greenhouse effect'.
3. Active carbon cannot be considered completely under any conditions where access of air can occur.
4. It is safe to store active carbon in large masses of individual units provided each individual unit is enclosed in an air tight container.
5. Storage procedures must ensure that active carbons are maintained in a minimum risk area.

[carbon, storage, container, fire - consequence, design or procedure error]

Lessons

1. Active carbon must be supplied packed in multiwall paper sacks, each sack individually enclosed in a stitch sealed heavy gauge polythene outer container.
 2. Active carbon supplied in this manner can be stored in a palletised stack as received provided adequate air circulation is allowed around each individual palletised stack.
 3. If for any reason active carbon can only be supplied in paper sacks without the outer polythene container, then the palletised stacks must be broken down and restacked so that adequate air circulation is allowed around each individual sack.
 4. Active carbon must not be stored in direct sunlight nor close to a heat source.
-

1610 28 March 1978

Source : GUARDIAN, 1978, 30 MAR.

Location : Tolosa, SPAIN

Injured : 0 Dead : 0

Abstract

A rail transportation derailment. Train derailed and 2 of 3 walls of rail tankers carrying hydrogen cyanide were torn away. Tankers drained without mishap. No release. Near miss.

Lessons

[None Reported]

1579 08 February 1978

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A rail transportation derailment and collision. The train containing a rail tanker of chlorine was derailed, the engine proceeded on its way with one box car attached. It met a mail train coming from the opposite direction and there was a collision between the mail train engine and the box car. A check was made of the overturned tanker and, apart from slight damage to the protective dome on the top, the tank appeared to be sound. There was no damage to any of the valve arrangement under the dome and no sign of leakage. Near miss.

Lessons

[None Reported]

1563 22 January 1978

Source : GUARDIAN, 1978, 23 JAN.

Location : Chatteris; Cambridgeshire, UK

Injured : 0 **Dead** : 0

Abstract

Vat of paraffin wax overheated and was in danger of exploding.

Area evacuated. Near miss.

[overheating, evacuation]

Lessons

[None Reported]

4090 10 January 1978

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

During preparation for maintenance of a drain on a steam line, a static electricity discharge was generated between scaffolding and a ladder which was in the steam leak.

[near miss]

Lessons

Re-emphasise the knowledge about static build-up from steam leaks, and the preventative measures available. (Training inadequate)

Source : HEALTH AND SAFETY MANUFACTURING & SERVICE INDUSTRIES 1978.

Location : ,

Injured : 3 **Dead :** 0

Abstract

At a manufacturer of dyes a serious gassing incident occurred while two process operators were charging chemicals into a reaction vessel. Hydrogen sulphide was suddenly emitted while they were charging bags of sulphur into the vessel and they and another employee working nearby were overcome. Only prompt rescue by other employees prevented fatal consequences.

The cause of the hydrogen sulphide evolution was a misunderstanding by the operators of oral instructions given by the chemist in charge of one of the chemicals being added.

[near miss, people, gas / vapour release, design or procedure error]

Lessons

This incident illustrates the dangers which can occur in the chemical industry if process instructions are not followed exactly. Written process instructions were provided but there was not mention there or in the operators' training of the dangers of hydrogen sulphide being evolved if the full charging sequence was not followed.

107461978

Source : HEALTH AND SAFETY, MANUFACTURING & SERVICE INDUSTRIES 1978.

Location : ,

Injured : 0 Dead : 0

Abstract

A major incident occurred at a chemical plant when there was an escape of 9000 litres of LPG. Shipping and rail traffic in the area was brought to a halt. The leak happened due to a pair of flanges on a 100mm line had been left unbolted. Three pipelines had been split to allow hydraulic valves to be fitted and the reconnection of the lines was left to the night shift to complete. A supervisor using a torch thought he had located all the unbolted flanges but in the dark he missed one.

When the plant was taken back into use, LPG leaked. Unfortunately the operators on the plant had not had training on the new hydraulic valves and thought that they had been closed. The LPG continued to escape for twenty minutes, until the plant engineer arrived and closed the valves. Employees were caught in the control room which was almost surrounded by the vapour, fortunately it did not ignite. Investigation of the incident revealed that no system had been laid down for work on pipelines at this plant. Action was taken and a penalty of £300 (1978) was imposed.

[gas / vapour release, operation inadequate, training inadequate, permit to work system inadequate, maintenance, near miss, inspection]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

During the start-up of a crude unit there was heavy leakage of crude from a flange which had been bolted up with no gasket in it, after being opened during shut-down.

The flange was at battery limits where a spade had been used to isolate the unit during shutdown. The spade was only removed after the unit had been tested for pressure tightness and so the absence of the gasket was not detected.

[crude oil, near miss, product loss, maintenance inadequate]

Lessons

The few flange joints made up after testing a unit as pressure tight require special attention.

One system is to have the maintenance man sign off each such joint as correctly made up. The other is to have an independent check.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An incident occurred which resulted from cleaning machine parts with a solvent, methyl methacrylate, in a polyethylene bucket.

An operator, while placing a third machine part in the bucket, narrowly avoided being burned by a flame, which shot up from the bucket to a height of 2 metres.

An investigation into the incident revealed that the solvent was pured into the bucket from a draw-off valve on a pressurised line, causing the bucket to accumulate an electrostatic charge. The charge then generated a spark when the machine part was placed in the bucket.

[fire - consequence, near miss]

Lessons

The report stated the following:

Where hydrocarbons and other low conductivity liquid is moving at relatively high linear velocity, as in this case through the draw-off valve, generation of charge will occur in the liquid. Therefore, valves for drawing-off liquids with low conductivity are to be provided with proper means of earthing. Whenever the liquid and/or the receiving vessel are bad onductors, charge accumulation to a dangerous level might occur.

Source : ICHEME**Location :** Antwerp, BELGIUM**Injured :** 1 **Dead :** 0**Abstract**

A carbon steel line from the outlet header of a bank of six fin fan coolers leading to a high pressure separator had cracked and corroded and was to be replaced. The unit was still partly in operation, but the wet gas compressor and the gas system were shut down. The repair work was carefully planned and was carried out without incident.

After completion of the repair work on the 8th December 1977, the system was progressively re-commissioned, the final operation being the removal of a blind under the relief valve of the high pressure separator. The flanges had been opened and the blind removed when the two maintenance fitters engaged on the work heard a rumbling noise in the drum with vibration of the relief line and valve. One fitter rapidly descended from the scaffold, down the access staircase to the ground level where he claimed he was affected by gas. The second fitter remained at the relief valve, putting on an air line supplied face mask and continued to close the flanges without incident.

The first fitter was detained in the Refinery Medical Centre for a few hours, apparently suffering from slight shock. He was subsequently sent to the local hospital as a precaution where he was detained for observation. It could not be verified whether he was actually gassed or suffering from shock.

Investigation revealed that a process operator had opened the outlet valve on one of the fin fan coolers without checking and ensuring that the fitters had completed their work on the HP separator. This action gassed up the separator system, with leakage from the still open flanges.

The work permit had specified that the work to be done required the use of air line face masks, and also the fitters were verbally instructed by their foreman to use the masks. The masks were available at the work site, connected to the air system, but the fitters neglected to use them.

[slip plate insertion/removal, commissioning, blind/spade/slip plate, operator error, near miss]

Lessons

The refinery has taken the following remedial actions:

1. The need for good communication between process and maintenance personnel was rediscussed with those concerned.
2. The two fitters received a verbal admonition for not following the conditions specified in the work permit.
3. Retraining sessions for all maintenance fitters and their supervisors have been organised, covering the topic of risks of gassing, correct use of air line face masks, and resuscitation techniques. This retraining will be given to groups of 10 personnel at a time, being later extended to cover most of the maintenance workers.

This incident demonstrates that even when a laid down system for safe work exist, and training and instruction on the requirements have been made, there is still no guarantee that they will be carried out. Generally the answer for a past era might have been more supervision to ensure that workmen carried out their work as instructed. With modern industry, demanding better trained, educated and more responsible personnel the working man has been given a greater share of the responsibility for carrying out not only his own work safely but his interrelationship with others' work. The law in some countries now demands (with varying effectiveness) that the working man shoulder his share of this responsibility.

Since additional supervision is unlikely it is important that retraining, and emphasis on correct working methods be given to all concerned, with increased random monitoring, not only by the safety department but particularly by performing departments, to ensure that workers are obeying the regulations.

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

Abstract

During a shutdown for maintenance, it was decided to discharge the catalyst from the reactor and, in accordance with the usual procedure, air was sent in the reactor while the circulation either in the quench column or in the absorber stopped. The temperature in the reactor was at first 80 degrees C and at the end of discharge operations it went up to 180 degrees C. At this point an increased temperature of up to 500 degrees C in the quench head and absorber bottom was noticed. Also, some smoke was coming out from the absorber vent. The operator stopped introducing the air and sent some steam in the quench column head so that the temperature would drop. After the survey the following damages were observed:

1. Quench column. The Raschig rings were melted and the demister grid warped. No damages were found in the column shell.
2. Absorber. This column suffered serious damages: the bottom packing grid, the distributor and the Raschig rings were partially melted and warped. The 15 lower plates were warped. The column shell was deformed for about 16 meters. Laboratory analysis indicated that the material became fragile.

[shutdown, maintenance, reactors and reaction equipment, catalyst, near miss, damage to equipment, air]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A fire-fighting water tank was disconnected for alteration and modification, which was then deferred. Alternative arrangements for fire fighting water supply were not made for over one year.

[modification procedures inadequate, near miss]

Lessons

Modification procedures inadequate: projects which rely upon other projects to provide alternatives must be cross referenced in the project management system.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

When a road tanker for liquid nitrogen was discharged into a factory's storage tank it was observed that the tank vehicle was 3 tonnes heavier than normal. An investigation showed that it had been filled with oxygen instead of nitrogen, and that the inert gas distribution system of the factory contained 30% oxygen. Luckily this incident had no severe consequences, since during the time between the filling of the storage tank and the moment when the error was discovered, no process equipment had to be purged with inert gas.

[near miss, labelling incorrect, loading, unloading, contamination, oxygen, nitrogen]

Lessons

The supplier had a licence to use his rail tank cars for both oxygen and nitrogen, using different coupling pieces. On both sides, hinged signs indicated the content. In the 'up' position they read OXYGEN. In the 'down' position NITROGEN. Probably due to vibration or shock, one of the signs had fallen into the 'down' position, thus indicating OXYGEN instead of NITROGEN.

Personnel at the filling station had received the verbal order to fill the tanker with nitrogen - however, on the side of the filling nozzle, the sign read OXYGEN. On their own initiative, they fitted the nitrogen nozzle with an adapter coupling for oxygen and filled the tanker.

The contents of the rail tanker were later transferred to the road tanker. The prescribed test for oxygen (phosphorus pipette) was made. But since this test works only up to 6% oxygen, the true nature of the contents was not detected.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

No. 1 stack on a boiler house was taken out of commission for repairs to its top section. To facilitate these repairs scaffold was erected around the top section of the stack by a contractor.

A strong wind was blowing and consequently no one was working at the top of the stack. At approximately 11.50 hours, a scaffolding plank, size 10' x 1", fell approximately 280' from the scaffolding, and landed in a car park 75 feet from the base of the stack. The plank broke into two main pieces on impact, but fortunately there was no injury to persons or equipment.

[strong winds, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A product suspension in benzene that can easily accumulate electrostatic charges was pumped into a kettle. On the last piece of pipeline, approximately 1.5m long, which consists of several enamelled parts, sparking was observed every few seconds.

[near miss]

Lessons

It must be realised that parts of pipelines can become electrostatically isolated by paint, enamel, gaskets etc. To cope with this hazard, a clean contact surface must be ground at a suitable spot on each part and the part must be earthed. It may be advisable to equip critical parts with earthing terminals or screw holes for the connection of earthing cables prior to their installation.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

During night shift an operator observed blue sparks jumping between aluminium cladding of a lagged glass vapour line and the aluminium cladding on an insulation of a nearby brine line, across a gap of approximately 3cm. The sparks could also be heard clearly. Benzene vapours were passing through the vapour line, the situation was considered dangerous.

[near miss, material transfer]

Lessons

[None Reported]

Source : ICHEME

Location : , FRANCE

Injured : 0 Dead : 0

Abstract

During the overhaul of a crude oil distillation unit, an air driven winch was being used to transport equipment to various levels of the 90 ft. high main distillation column. To assist the descent of the winch hook, a 56-lb static measuring weight was being used as ballast. This was attached to the winch by a 18 inch wire sling threaded through the 18 inch diameter handle of the static weight.

The incident occurred when the winch was being lowered, the handle of the static weight failed and the 56-lb weight fell to ground level. The weight landed within the roped off area of the winch drive and there was no injury to personnel.

On inspection it was found that the handle of the weight had been previously cracked through a section of approximately 80%.

[maintenance, winch, mechanical equipment failure, near miss]

Lessons

It has been recommended that in future bolted weights be used for this duty.

This incident also shows the degree of care needed, not only with the major components of any lifting equipment used but also with its associated equipment such as lifting eyes, hooks, shackles, etc. It also demonstrates the value of roping off areas beneath lifting operations.

9477 21 February 1977

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A road transportation incident. A passing motorist managed to draw the attention of the driver of a road tanker of a leak coming from the rear of the vehicle. The tanker driver pulled over onto the hard shoulder to examine the tanker and found a slight leak from the joint between the tank and the outlet pipe at the rear of the vehicle.

The driver then, following the laid down procedure, rang the emergency services.

The fire brigade blocked off the drains to prevent caustic from entering them and washed the slight spillage of caustic onto the spare ground adjacent to the hard shoulder.

A spare tanker was then sent for to transfer the load.

An investigation into whether caustic had spilled into the drains and a nearby watercourse found that there had been no contamination.

Approximately 15-25 gallons of caustic were lost in the incident.

[near miss, caustic soda]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A leakage of heavy gas oil occurred from a 4 inch pipeline linking a crude oil distillation unit 'A' and a vacuum distillation unit. Approximately 500 litres of gas oil escaped from a crack in the pipeline, and a cloud of vapour formed and drifted towards the hydrofiner heater. Fortunately this did not ignite.

The vapour was condensed and dispersed by the refinery fire brigade using water spray. As a further precaution, mobile foam cannons were positioned, but these were not needed.

One hour before the incident the 4 inch pipeline had been taken out of commission, and during the subsequent cooling down period one of the pipeshoes (that had previously slipped from the pipe support) fouled against a section of fire proofing concrete. This restricted the contraction of the pipeline and caused the fracture.

From the subsequent investigation the following was established:

1. The pipeline was initially designed for an operating temperature of 93 degrees C.
2. In 1972, the line temperature for product rundown was raised to 250 degrees C. The new operating conditions were checked, and a practical test was carried out to ensure that the line was fully supported under the new conditions

it was considered that during that test either:

- a) The pipeshoe was already not on the pipe support but on the fire proofing and that this went unnoticed, or
- b) The new range of product temperature conditions in the line were not achieved.

[decommissioning, pipeline, crack, fracture, spill, gas / vapour release, heavy gas oil, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

Maintenance was being carried out on the drill stem on a rig used to drill coke out of the drums on a delayed coking unit. The operator started to move the stem to facilitate other work and put the maintenance men working on the drill stem in danger. Fortunately another worker noticed the error in time and stopped the drill stem.

[repair, shutdown, winch, pipe, near miss, operator error, safety procedures inadequate]

Lessons

From the work permit system the operator should have known that work was in progress on the drillstem. In addition he should have checked visually before moving the stem.

However, safety procedures should allow for an operator making an occasional mistake particularly during a busy shutdown. In this case that should have taken the form of locking out or tagging the switched which actuated the drill stem.

The same applies to all power actuated equipment.

Source : ICHEME

Location : , UK

Injured : 1 Dead : 0

Abstract

A 4,500 gallon capacity vacuum tanker of gross weight 32 tonnes was parked near API Separators to offload recovered gas oil. The vehicle was positioned at right angles to the separator on a slightly inclined surface of loose chipping, approximately five feet from the separator rail.

After parking the vehicle and applying the air operated hand brake, the driver left the cab to couple up the offloading hose leaving the co-driver in the cab.

When the driver got to the rear of the vehicle it started to move back towards him. He jumped clear of the vehicle which crashed through the rail and

approximately 15 feet of tanker came to rest in the south bay of the separator. The co-driver felt the vehicle moving backwards and jumped from the cab.

The driver was treated at the Medical Center for shock and the co-driver for a slight pain in the left thigh. Other than this there was no injury to personnel.

[unloading, rail tanker, unidentified cause, near miss, injury]

Lessons

1. Wherever possible ces should be provided at all sumps or locations for such vehicles if they are used on a routine basis. Concrete ridges correctly positioned can often be used as a alerting device to prevent vehicles backing through sump rails.

2. Where vehicles are used at non-routine duty locations, then it is up to the supervisor in charge of the area who has made the request for them to ensure that safe access is possible.

Such vehicles are often supplied on contract and although the driver is largely responsible for its mode of use, the driver cannot necessarily be expected to be familiar with local ground conditions.

3. The refinery therefore cannot absolve itself from the need to ensure safe siting of such vehicles.

120321977

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A discovery was made that check valves used on an oxy-acetylene cutting equipment at a refinery were failing in service. As a result, the welding engineer carried out tests on some of them and on new valves held in stock.

The results indicated an unacceptable failure rate, even on new valves, and it was decided to replace all these check valves with a different type which had been tested as satisfactory.

Unfortunately, before the change-over was completed, a fire occurred in a tankage area, caused by a flash-back from a cutting torch.

An inspection revealed a failure of an old type check valve. Although the damage was confined to the destruction of some electric cable from a nearby welding machine and the gas hoses, it could have been more serious. Gas hoses which had not been fitted with the new valves were withdrawn from service.

[oxy-acetylene cutting, cylinder, valve, valve failure, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

The dry gas from the product stabiliser on a pentane isomerisation unit contained HCl (hydrochloric acid), which was used to activate the catalyst. To prevent corrosion downstream the gas was passed through a caustic scrubber. However, the mixing was not instantaneous or completely effective. This led to serious corrosion in the bottom of the scrubber and its trays.

[mixer, near miss, design inadequate, corrosion]

Lessons

1. When neutralising an acid all the equipment in contact with it has to be corrosion resistant up to the point that neutralisation is complete.
 2. To reduce the amount of expensive corrosion resistant alloy used, rapid mixing is desirable. In this case a static mixer with the caustic and gas flowing directly to the inlet was installed.
 3. The mixing zone was only 30cms long.
-

120381977

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A railcar supplying normal pentane was unable to connect into the pump-out manifold at this loading rack.

Subsequently a vacuum tanker was used to off load the rail car using a hose inserted through the top manway. During this operation, the engine of the vacuum tanker started to speed up. The hose was disconnected from the tanker to allow it to be moved clear of the loading rack, and a spillage occurred as normal pentane continued to flow due to the syphoning effect.

The overrun protection device of the vacuum tanker was checked and found to be in working order.

[loading, rail tanker, road tanker, overflow, spill, near miss, pentane]

Lessons

1. Instructions have now been issued banning the use of vacuum tankers for unloading rail cars, except in certain situations approved by the Assistant Operations Superintendent of the area.

2. The overrun protection has now been reset to operate at 100 r.p.m. below the safe maximum to permit checking of the overrun protection during routine servicing.

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A 25,000 barrel capacity, cone roofed tank used for storage of residual fuel oil, failed.

The entire roof was pulled inwards and side plates were buckled along one side. At the time of the incident, no operations were being carried out in the tank, and the ambient temperature was about 0 degree F. There was no actual leakage of the tank. It was noted that there was a column of solid ice between the tank roof and the bottom of the tanks goose-necked vent.

[storage tanks, material of construction failure, near miss, collapse, vacuum, cold weather]

Lessons

It was concluded that the tank roof collapse was caused by ice accumulation in and under the vent. A vacuum was pulled during the last transfer of oil out of the tank, two days before the incident. This occurred because the vent was either blocked or partially restricted, by ice. The root cause, however, was traced back to modifications carried out to all such tanks in the autumn preceding the incident. The roofs were insulated (lagged) as an emergency saving measure. Previously, only the walls had been insulated. Without roof lagging, any moisture present from filling, emptying etc. would condense on the underside of the roof and freeze in winter. On warm days, it would then vaporise out of the vent. With roof lagging, condensation on the roof will not occur. Instead, water goes straight to the vents which, in cold weather, if the water contact is sufficient, will become blocked by ice. After the incident, all other tank vents were found to be partially restricted by ice. The vents were redesigned and insulated in order to prevent a recurrence.

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A plant for the manufacture of iso propyl alcohol was being recommissioned after a shut down for inspection and maintenance. Shortly after introducing liquid propylene feed to the depropaniser distillation column, the operator noticed a substantial gas / vapour release from flange joints at the tops of two reboiler heat exchangers. The leaks became worse, so a Factory Emergency was initiated and the Works Fire Brigade stood by. In the event, there was no fire. After about 40 minutes the leakage rate was reduced to an acceptable level.

It was established that a leakage test had been carried out when the reboilers were reassembled. However, lighting conditions during the tests were poor, and the job was not supervised by a foreman. Also, the tests were carried out at about 100 psig, whereas the operating pressure was about 250 psig.

On subsequent inspection, it was found that the bolts on the top joints of both heat exchangers (which had been tightened by hand) were inadequately tight.

The bolts on the bottom joints, which had been tightened using an impact wrench, were secure. In addition, it was found that the soft metal joint on one of the flanges had been misplaced.

[start-up, commissioning, maintenance, near miss, bolts incorrectly tightened, gasket failure]

Lessons

The following points were noted:

1. better procedures required for the fitting and tightening of flange joints.
 2. better procedures required for leak testing.
 3. tests should be carried out at as close to operating conditions as possible.
-

Source : ICHEME

Location : , HOLLAND

Injured : 0 Dead : 0

Abstract

A quartz sulphur analyser in a Dutch laboratory was severely damaged by fire, and subsequently the analyser had to be replaced.

The quartz sulphur analyser was being used to determine the sulphur content of gas oil and fuel oil samples. In the test, a quartz tube is heated with an LPG burner. The LPG is piped into the laboratory from a gas bottle store, with copper piping around the laboratory and valved offtakes at strategic locations, leading through short rubber hoses to user equipment.

The analyser had been in use some 30 minutes when the technician had to leave the laboratory for some 10 minutes. On his return the analyser was on fire with considerable smoke and flame to a height of 3 ft. above the analyser. The fire was extinguished with a CO2 extinguisher and the gas supply isolated.

The burner supply hose was found to be detached, and it is considered that a jet of burning gas had entered the analyser compartment, burning and destroying its electrical components.

The most likely cause of the incident was thought to be a small hole in the rubber supply hose through which LPG leaked and ignited, leading to the detachment of the hose from the burner.

The alternative possibility of the hose being "blown off" was considered as less likely, nevertheless in future all such hoses will be provided with hose clamps, and regularly inspected for wear.

[laboratory work, fire - consequence, gas / vapour release, near miss, damage to equipment]

Lessons

Where a test involves a considerable degree of open heating and heat radiation such as this, it is unwise to leave the equipment unattended for even a few moments.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

It was believed that a can of gasoline was left open after use and that the escaping vapour percolated to an adjacent room in which there was electrical equipment. The electrical equipment came on under the control of a thermostat, and ignited the vapour/air mixture.

The fire was rapidly extinguished by the use of five fire extinguishers, which were located within or in the neighbourhood of the laboratory.

The company revised of its methods of storing flammable liquids and control of ignition sources within the laboratory.

[fire - consequence, laboratory work, gas / vapour release, near miss]

Lessons

Laboratories are particularly vulnerable in many companies as the containment of hydrocarbons and use of intrinsically safe or flameproof equipment do not apply because of the nature of the work. Laboratories must be aware of the following safe practices:

1. Limitation of sample sizes to the minimum.
 2. Correct segregation and disposal of flammable samples.
 3. Careful zoning and control of ignition sources.
 4. Use of high flashpoint cleaning fluids; and
 5. The training and expertise of the laboratory personnel.
-

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

Abstract

A 30 foot stand of aluminium 'sip-up' light weight scaffolding was pushed by a group of workshop personnel into the live 415 volt bare conductors of the workshop's gantry crane, blowing all three of the 200 amp fuses in the circuit.

The burn marks on the scaffolding showed that all three conductors were contacted. There was no apparent discharge to earth through the scaffolding, and the workers who were wearing rubber soled safety boots were not injured. One of the group who had his bare hand on the scaffolding at the time of contact stated that he did not feel anything.

The scaffolding had been erected two days previously for use in dismantling the gantry crane auxiliary hoist motor. The bare conductors were isolated at this time. The scaffolding was then moved to another section of the workshop, away from the conductors. On the day of the incident an instruction was given to repair damaged sheeting (situated some 15 feet from the ground), in the corner of the workshop where the bare conductors are located at a height of 30 feet above ground. Repairs were attempted from a ladder, but this did not give safe access. There were no riggers or scaffolders in the workshops, so advantage was taken of the already erected mobile scaffolding.

Site recommendations to avoid a recurrence of this incident include protection of the bare cable runs against contact by either personnel, scaffolding, or by the various wheeled vehicles that enter the workshops. A number of pictogram signs are also to be fitted on the wall standards warning of the presence of the electrical cables. These signs will carry a supplementary warning message written in English, Arabic and Urdu.

[maintenance, scaffolding, mobile, inadequate guarding, near miss

Lessons

A number of refinery workshops and stores contain overhead cranes, and usually the pick up of electrical power is from bare conductors rather than from a trailing cable system. There are proprietary guarding systems available for shielding bare conductors which allow contact through a narrow slot for the crane electric motors to pick up the electrical current. Home made methods of guarding are sometimes less effective and often it is forgotten to guard the top of the cable leaving a gap through which a man, say on a ladder, may still touch the cables with his hand. In stores areas the storage racks should not be built above a height where contact of bare conductors by a man standing on the racks is possible in any foreseeable manner, eg holding a long length of metal tubing in his hands.

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A near miss incident occurred. A blade in a Bauer mill failed causing other blades and parts to be torn apart. The mill door opened and shrapnel blew out. No injuries were reported.

[solids processing equipment, explosion / pressure release, mechanical equipment failure]

Lessons

[None Reported]

1265817 August 1976

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A newly installed lighting fitting fell narrowly missing a worker. An investigation found that the fitting was still firmly in position, but the well glass had shattered and fallen to the ground. No mechanical contact of any sort was made with the fitting before the glass shattered.
[near miss, material of construction failure]

Lessons

[None Reported]

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

Abstract

On 10th March, at 6.25 hrs. an escape of vapours was observed in the pump area of this LPG Storage Area by an operator of the adjacent LPG Loading Station.

The operator immediately alerted the tank farm operators, and a foreman operator arrived within a few minutes. Having established that a 1 inch drain valve underneath a 2 inch propylene rundown line had fallen to the ground the refinery fire brigade was alerted. The fire brigade remotely actuated the water spray systems on all (8) of the LPG spheres and commissioned 2 fixed water cannons. At the same time, the rundown line was valve isolated at both ends.

The weather was extremely cold, with a temperature of around 10 degrees C. Whilst the rundown line was being depressurised through the drain nozzle, the leakage repeatedly froze over, due to the formation of ice, and then thawed, because of the steam tracing on the line. After the steam tracing had been shut off and a temporary line for depressurisation at the catalytic cracker had been installed, the escape of vapours ceased at approx. 7.25 hrs.

The subsequent investigation showed that the body of the 1 inch ball valve was screwed to the end fittings and then seal welded. It is believed that during the construction of the refinery (1967) one of the end fittings had been removed from the valve and welded onto the 1 inch branch of the 2 inch line, the remainder of the valve being then assembled. During this operation the body could not have been fitted correctly as the threads were severely damaged. As the end fitting was not concentrically fitted, the 'O' ring was found to be only 20% effective, and the end fitting was not seal welded to the body. The seal face and the body showed severe corrosion from which it was considered that a minor leakage could have been present for some time. The leakage could have been sealed, and there-fore become unidentifiable, by water collecting in the short leg below the 2 inch line. Some 80 similar ball valves of the same make in the LPG Storage Area were subsequently inspected, but no other defects were found.

[storage, storage tanks, storage sphere, valve, ball valve, corrosion, gas / vapour release, near miss, LPG]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 1 Dead : 0

Abstract

A sulphuric acid pump on the chlorine drying plant was replaced. The pump was changed and then underwent a 24 hour trial proving trial. After an hour of this trial a flange, on the pump body delivery side, leaked. This was replaced but leaked more severely and this time sprayed on the operator on the neck and face. His jacket was destroyed by the acid. The operator was wearing spectacles, however not the specified chemical goggles.

[people, near miss, maintenance, pipework, burns, injury]

Lessons

Shrouds should be fitted on flanged on pressurised sulphuric acid lines. Correct Personal Protection Equipment should be worn.

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

An employee wearing a compressed air mask was working in a well. Compressed air was supplied from two large cylinders. When one of the cylinders was nearly empty, the man observing the activities from the outside tried to switch over to the new cylinder, but he was unable to do this fast enough and the air supply to the mask was interrupted.

The man in the well was able to remove the mask and climb out.

[breathing apparatus, cylinder, near miss, competency lacking, entry into confined space]

Lessons

Although the observer was trained in handling compressed air breathing sets he had no experience of large cylinders.

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A sample of soda from the Butane Washery submitted to a laboratory for testing was found to be predominantly liquefied butane. The sample, which was presented in a 16 oz. glass bottle, was boiling at ambient temperature in the laboratory.

The sample was taken by an inexperienced operator and unfortunately it was presented to an inexperienced Technical Assistant (Trainee). The latter, however, suspecting something was wrong, referred the matter to an experienced person and a serious incident was averted.

[laboratory work, near miss, operator error]

Lessons

Ensure that samples are drawn from the correct approved sample points and that aqueous solutions are free from hydrocarbon oils and liquefied gases.

Source : ICHEME

Location : , UK

Injured : 0 **Dead :** 0

Abstract

An alert operator noted a loose tube sheet flange stud on a high temperature, high pressure heat exchanger in an hydrodealkylation unit.

The stud was found to be cracked through an on testing it proved to be standard steel rather than the alloy type specified. Some of the other studs had started to crack.

The studs had been replaced on the previous shutdown when the heat exchanger was opened up to clean the tube bundle.

[heating, shell and tube heat exchanger, near miss, incorrect material of construction, crack, maintenance inadequate, hydrogen]

Lessons

Quality control of replacement parts used in maintenance is as important as for new equipment.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident with a very serious potential occurred on the No.1 Distillate Hydrotreater several days after recommissioning. During steady operation of the unit, a dull bang was heard by operations personnel, and simultaneously, a large discharge of gas was observed. It was quickly established that the gas discharge originated from the base of the DHT reactor, and emergency shutdown and depressuring of the unit was immediately initiated. The prevailing wind caused the gas cloud to drift towards the feed residue heat exchangers of the No. 2 Crude Distillation Unit. Ignition did not occur, and the gas cloud dispersed as the plant was depressured. Subsequent inspection of the DHT reactor system revealed that the leakage had occurred at a temporary pressure gauge assembly, fitted to the reactor differential pressure instrumentation piping. The pressure gauge had been put in during the overhaul to measure the slight positive pressure of nitrogen being maintained over the catalyst to prevent ingress of air. Under DHT operating pressure, the rubber seal rings of the coupling were blown out, the maximum recommended working pressure for such a coupling is 10 kg/cm². [commissioning, pressure meter/control, temporary, incorrect equipment installed, inspection inadequate, gas / vapour release, near miss]

Lessons

The refinery's conclusions and actions were as follows:

1. The incident demonstrated the potentially disastrous consequence of the use of fittings which did not meet the recommended Engineering Standards for a given duty.
 2. The incident emphasised the importance of and the need for thorough and effective inspection of plant at the pre-commissioning stage following an overhaul. More time for check-outs will be allocated in future.
 3. During an overhaul, much of the work carried out affects the integrity of the plant, and must be properly executed. The procedures and practices of the Refinery engineering and operations departments are under review with the intention of reducing the risk of the plant being returned in an unsafe condition.
-

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A laboratory technical assistant was withdrawing LPG from a sample bomb to carry out a test when the valve spindle blew out. Luckily the spindle was facing towards the ground and the man was not injured.

The valve was one of three new valves that had recently been fitted to LPG sample bombs to replace the original standard valves which were leaking.

Although these new 1/4 inch valves met the required pressure rating, they were of the type where the nut holding the spindle in place on the valve had a tendency to unscrew. Subsequently it was found that because the correct valves were not available at the time, the lab instrument maintainer had fitted non-standard 1/4 inch valves. On checking other non-standard valves their nuts were also found to be loose, and the bombs were withdrawn from service.

The refinery has now ensured that standard valves (which will not unscrew) are fitted to all the LPG sample bombs and the stock of non-standard 1/4 inch valves will only be used on water service.

[sampling, laboratory work, valve, incorrect equipment installed, near miss, LPG]

Lessons

The gradual unscrewing of valve spindles in operation from certain types of valve is a feature that has been appreciated in plant use for many years, and such valves are normally relegated to low hazards services such as water duties, or avoided altogether.

Refinery laboratories are advised to alert their maintenance staff to this hazard.

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

Abstract

A rail transportation incident. A leak occurred on one of the liquid phase valve of a rail tanker containing chlorine. An emergency team arrived at the incident. The liquid valve, was in the open position, which was allowing a relatively large amount of chlorine to escape. In the closed position the leak was less important. The emergency team established that the chlorine was escaping from a hole provided to indicate a leakage of the valve bellows, which indicated that this must be holed. Chlorine was also leaking from the pneumatic impulse lines, which indicated that the valve membrane was also holed. Using air sets, the emergency team blanked off the initial source of the leakage, and then disconnected the air connections which enabled them to also blank off the air inlet point. They then checked the other valves and found them to be in the same condition, the chlorine having been able to pass through the inter-connected operating air pipe work into the valve chambers of the two other valves, and after testing they were shown to be gas tight. It was then possible to carry on with the emptying of the rail tanker after the valves had been opened manually. The emergency team completed their work and were able to leave.

[near miss]

Lessons[None Reported]

Source : FIRE PREVENTION 207, MARCH 1988.

Location : Alabama, USA

Injured : 0 **Dead** : 0

Abstract

A fire occurred on a reactor. The incident occurred when a worker checking for air leaks around the cables penetrating the reactor walls with a candle. The candle ignited the foam plastic infill, which then set fire to cabling. No other fires or releases of radioactive material occurred.

The fire destroyed a number of safety related cables which were run in the same trays as power cables, causing partial loss of reactor control.

[fire - consequence, reactors and reaction equipment, damage to equipment, design or procedure error, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , GERMANY

Injured : 0 Dead : 0

Abstract

While carrying out a hot tapping operation on a 10 inch isopentane line, product sprayed out of the stuffing box of the cutter spindle. Fortunately ignition did not occur.

During the subsequent investigation it was found that:

1. There was no flow in the line.
2. A fire attendant had not been specified on the work permit for the actual hot tap operation, only during the associated welding work.
3. Some 10 metres away additional welding work was in hand.
4. The hot tapping equipment was not pressure tested before use, hence the absence of packing in the stuffing box was not detected.

The refinery written procedures for the use of hot tapping equipment in fact covered all of the above points. A circular has now been distributed to those concerned with the use of hot tapping equipment, reminding them of the requirements for such work.

[hot work, tools & access equipment, testing inadequate, near miss]

Lessons

Hot tapping machines should be hydraulically tested before use.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Hydrogen sulphide hazard during liquid sulphur loading. Approximately 1% volume hydrogen sulphide H₂S in air was measured at a road tanker manhole cover whilst loading sulphur produced in a Claus-type sulphur recovery unit. Fifteen minutes after completion of loading this dropped to 10-30 ppm.

Liquid sulphur, when leaving the thermal and catalytic stage of the unit, contains a certain amount of hydrogen polysulphides.

These compounds slowly decompose at elevated temperatures and form hydrogen sulphide, which is liberated by desorption and can result in high hydrogen sulphide concentrations in the gas phase above the liquid sulphur. Therefore, the hydrogen sulphide levels detected are expected to be high.

[high temperature, near miss]

Lessons

The report stated the following recommendations:

1. Safety procedures to be enforced, such as wearing self contained breathing apparatus.
 2. Hydrogen sulphide levels during loading to be reduced by ventilating tanks and pits.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

During the loading of a consignment of liquid chlorine drums, the chlorine filler operator noticed a bulge in the end of one of the drums. The drum was removed from the vehicle, checked weighed and then emptied.

The gross weight of the drum and liquid chlorine was 1660Kg, compared with a normal weight of approximately 1480Kg. The drum was filled on the 2 April and when interviewed, the operator who filled it was not aware of any fault.

The reason for overfilling appears to have resulted from a mathematical error on the part of the operator, but on the basis of maximum contents of a drum, it is not certain how full the drum would be.

[overflow, near miss]

Lessons

The reports recommendations:

There were no previous known incidents of overfilling liquid chlorine drums but in view of the potential danger, a specification to provide a suitable alarm to warn operators when filling is near to completion is to be issued.

Similar consideration will also be given to the cylinder filling operation.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A fire occurred in the heat banks and ducting of a friction dust plant oven floor. Fortunately the fire did not spread to the trolleys in the ovens due to the metal mesh filters in the heater banks acted as flame arresters. The activation of the steam snuffers in the ovens during the incident effectively prevented later ignition.

Chemical involved: furfural

[fire - consequence, near miss]

Lessons

The following recommendations were made:

The ovens and ducting to be fitted with effective detectors to give early warning of fires and to automatically shut off the circulating and scrubber fans in the event of their being activated.

Source : LOSS PREVENTION BULLETIN, 009, 5.

Location : ,

Injured : 0 Dead : 0

Abstract

It is common refinery practice to route process water from light ends vessels through a water disengaging drum before it is sent to the sewer. The water disengaging drum is usually vented to the flare system so that any light ends hydrocarbons which might break through with process water from the vessel can be adequately disengaging from the water and then vented safely, so ensuring that only hydrocarbon-free water is routed to the sewer.

On the day of the incident, the level control valve at a butylene wash tower failed wide opened due to a freezing problem. A large quantity of butylene came out of the outlet seal leg from the water drum, at the sewer, and covered a considerable area at grade with hydrocarbon vapour. Fortunately the source of butylene was found quickly enough to prevent a gas cloud explosion. However, the circumstances clearly class this event as a near miss accident.

[level meter/control, valve failure, instrumentation failure, separation, cold weather]

Lessons

Design Lessons

1. During the initial design stage, it was intended to route process water to offsite handling facilities requiring a battery limit pressure of 125 p.s.i.g. The level control valve on the wash tower was specified to pass 4 GPM water with a pressure drop of 15 p.s.i (i.e. 140 p.s.i.g = 125 p.s.i.g + 15 p.s.i.g. When the decision was made later on to install the onsite water disengaging drum, this control valve pressure drop was not changed from 15 p.s.i (i.e. 140 p.s.i.g = 125 p.s.i). this oversized control valve passed far more liquid butylene during the instrument failure than would have occurred with a properly sized control valve.
2. Flare systems pressures above 0 p.s.i.g under normal conditions were not considered. Venting to a flare system introduces the problem of maintaining adequate water hold-up within the vessel.
3. The line size of the vapour vent to the flare system was too small. Furthermore, the downward leg of the water seal would have been more effective with a larger cross-sectional area.

Source : ICHEME

Location : Kurashiki City, JAPAN

Injured : 0 **Dead :** 0

Abstract

A rupture disc failed on a polyethylene reactor of a production train. No fire occurred as a result.

The cause of the incident was due to a broken support for the roller bearing of the agitator on the reactor. Heat produced by friction on the broken bearing caused decomposition of ethylene. No one was injured in the incident.

[bursting disc failure, mechanical equipment failure, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Two explosions occurred within nine days of one another in a combined lube/seal oil reservoir supplying two refrigerant compressors; both explosions resulted from the same cause.

The tank is approx. 8 ft. square in cross section and except for the top, which is bolted on, is of all welded construction. The tank contained a separate vessel for sour seal oil return; the oil in this compartment flowed to the main reservoir by gravity, any vapour being vented to atmosphere. An oil/water separator was also included in the system. The first explosion followed by a flash fire opened half of the top lid, shearing 36 x 2 inch bolts, and slightly distorting some return oil lines and instrumentation. Following this explosion a continuous nitrogen purge was maintained on the tank but failed to prevent the second explosion nine days later which caused similar damage. Frequent checks were made on the vapour space in the tank during the period between explosions and although results varied, it is reported that explosive mixtures were always found. Subsequent investigations concluded that the explosive atmosphere was generated from hydrocarbon vapours returned in the sour seal oil and air induced through the pulsating separator and possibly via air vents. Ignition might have occurred from static electricity generated by falling oil or water settling out through the oil in the reservoir.

[cooling, tank, compressor, static, explosion]

Lessons

The following recommendations were made:

1. Fit an air de-entrainment pot in the separator return line
 2. Fit an external heater on the sour seal oil line to facilitate removal of flammable vapours
 3. Monitor the lube oil quality regularly
 4. Operate with higher levels in the main lube oil reservoir
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A potentially hazardous condition arose on a crude unit when a flexible service hose was left connected between the fire water system and a thermowell boss on a stabiliser overhead drum during the recommissioning of the unit. The stabiliser column was then steam tested and brought on stream with the utility hose still in position. Apart from the obvious hazard that could have resulted from the failure of the hose, the stabiliser overheads were pressured into the fire water system creating a further hazardous condition to the refinery in general.

The incident is included to demonstrate the care required by operating and maintenance personnel when equipment is being handed back after overhaul.

The stabiliser column had been shut down for chemical cleaning but before recommissioning it was decided to water wash the overhead drum to remove any acidic material that may have accumulated during the column cleaning. To do this a service hose was linked from the fire water system to a thermowell boss on the inlet of the overhead drum and the vessel washed to sewer.

[operational activities, hose, operation inadequate, near miss]

Lessons

To avoid accidents of this type:

1. No connections should be permitted from a fire water system to any process line/vessel unless covered by an authorised 'permit'.
 2. Connection of temporary lines/hoses to any process line/vessel should not be permitted other than via a vent or drain block valve.
 3. Such connections must include a non-return valve fitted in the assembly as near as possible to the process line/vessel.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident occurred on a crude unit when a water wash injection pump failed and crude oil backed through the non-return valve entering the wash water tank from which oil overflowed to the sewer system. There was no ignition and the operational personnel quickly handled the emergency.

The problem of non-return valves passing had occurred previously despite a monthly visual check to ensure that the valves were in a satisfactory operating condition. However, after this latest failure the non-return valve concerned was tested at the workshops and proved to be passing.

The valve faces were machined and the valve returned to service where it was tested under operating conditions and found to be satisfactory.

[pump failure, reverse flow, processing]

Lessons

This incident emphasises the need to establish tighter routine maintenance of desalter wash water injection pumps and associated non-return valves.

Source : ICHEME

Location : , GERMANY

Injured : 0 Dead : 0

Abstract

Reduced crude sprayed out of the breather hole in the bonnet of a relief valve recently installed in the residue system of this revamped crude unit. The spray remained in vapour form and was carried by the wind over the gas plant in the direction of the power station, a distance of some 200 metres. Fortunately the cloud did not ignite and no personnel were injured. The relief valve, some instrumentation and insulation had to be renewed.

The incident happened when a contractors instrument mechanic, installing cabling in the plant control room, disconnected the signal wire of the pressure transmitter in error. This resulted in the control valve downstream closing, thus increasing the pump discharge pressure and subsequent lifting of the valve.

A complete rupture of the valve bellows had occurred, either previously during normal operation or at the time the valve lifted, and atmospheric residue entered the valve bonnet and hence to atmosphere through the breather hole.

[gas / vapour release, contractor error, near miss, refining, safety relief valve]

Lessons

The following recommendations were made:

1. Before installing relief valves on modified equipment a full investigation to be made to ensure that no safety hazard is introduced
 2. Stronger control procedure should be enforced when working on instrumentation on an operating unit.
 3. The breather holes in relief valve bonnet should be fitted with pipes routed to a safe location to minimise any dangers arising from product escape.
-

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

An uncontrolled runaway reaction occurred in the polybutene plant reactor. Despite operation of the two relief valves, the vessel was overpressurised resulting in the displacement of the gasket and a number of flanged joints, with subsequent discharge of flammable material to the surrounding area.

The fire service were requested to stand by, but in the event were not required to take action.

The discharge lasted for 20 to 30 minutes.

[overpressurisation, spill, near miss]

Lessons

1. The capacity of the relief system should be re-appraised.

2. Flange joints which are subject to repeated cycling by pressure and temperature should be checked for condition and tightened at scheduled intervals.

Source : AMMONIA PLANT SAFETY, A.I CHEME, VOL 13, 1971.**Location** : Texas, USA**Injured** : 1 **Dead** : 0**Abstract**

An explosion followed by fire occurred in a carbon absorber, used to remove chlorides from mixed synthesis gas (H₂ + N₂). This absorber, one of a pair, formed part of the flow stage synthesis gas purification stage used for oxygen, chlorides, oil, mercury and carbon dioxide from the synthesis gas before it passed to the ammonia synthesis stage. The absorber was a robust pressure vessel, rated at 364 psig/650 degrees F. It ruptured into three large sections, plus fragments. The large sections (up to 1400 lb in weight) were projected up to 90 yards. A hydrogen fire, and some electrical wiring burning occurred, one operator sustained severe burns and fortunately recovered, due to prompt first aid and excellent subsequent medical care.

[fire - consequence, near miss]

Lessons

The root cause of the incident was excessive oxygen content in the H₂/N₂ synthesis gas, ignited by the deoxo catalyst in the oxygen removal stage immediately downstream of the absorber. This catalyst is platinum based.

The instrumentation to monitor the oxygen content of the synthesis gas at various stages, did allow for shutdown of the gas compressors (in effect, the entire purification process) in the event of higher than normal oxygen content of the synthesis gases. However, oxygen content increased from not greater than 20 ppm, to 4200 - 7600 ppm (on the basis of part incident sample analysis). Thus, the available instrumentation was not adequate to guard against all circumstances. There were indications that the oxygen entered the process in the nitrogen which was "shipped in" from an off-site source.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident occurred when an operator recommissioned a fin-fan cooler upon which a fitter was working. Fortunately the fitter was still removing the safety guards and was not injured.

The electrician, when requested to electrically isolate a fin-fan cooler required by maintenance, signed the Work Permit to certify that he had done so before isolating the equipment, even though this procedure is strictly forbidden. In the event, he became involved in another task and the Permit was issued and work commenced without electrical isolation of the motor. A second unit operator, seeing the fin-fan had stopped, restarted the fan.

[operator error, competency lacking]

Lessons

Following this incident the company carried out a review of the Work Permit system with particular reference to their issue.

As an additional safeguard against possible malpractice, hoods are now placed over push-button pedestals in addition to certified electrical isolation.

106501973

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident occurred in an oil refinery during inspection of a reactor vessel.

In order to improve the ventilation for an inspector to enter the vessel, an air line was connected to one of two unmarked lines because of the length of the sampling hose the check was only valid for the top 1.5m of the tank.

The inspector entered the vessel with caution, and carried out further oxygen checks as he descended. He found that at 3m below the top there was only about 10% oxygen: he left the vessel. It was later found that the unmarked line was a nitrogen supply.

[entry into confined space, incorrect chemical present, identification inadequate, atmosphere not tested, near miss, air line, reactors and reaction equipment, nitrogen]

Lessons

The following changes were made:

1. Line markings were improved and a colour code introduced.
 2. A rule was made that only clearly marked air lines must be used for purging.
-

112111973

Source : ICHEME

Location : , NORTHERN IRELAND

Injured : 0 Dead : 0

Abstract

A near miss incident occurred at a refinery when an operator recommissioned a fin fan cooler upon which a fitter was working. Fortunately the fitter was still removing the safety guards and was not injured.

The electrician, when requested to electrically isolate a fin-fan cooler required by maintenance, signed the Work Permit to certify that he had done so before isolating the equipment, even though this procedure is strictly forbidden. In the event, he became involved in another task and the Permit was issued and work commenced without electrical isolation of the motor. A second unit operator, seeing the fin-fan had stopped, re-started the fan.

[operational activities, fin fan cooler, operator error, isolation inadequate, management system inadequate, near miss]

Lessons

As an additional safeguard against possible malpractice, hoods should be placed over push-button pedestals in addition to certified electrical isolation.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Marine transportation. A serious breach of local dock regulations occurred at approximately 2100 hours on 30th August, 1972, aboard a berthed marine tanker during the discharge of a part cargo of 5,000 tonnes of ethyl benzene. Ship's personnel were observed by terminal employees to be carrying out welding repairs during the discharging operation. Work was stopped immediately by a mobile security patrol guard whose vigilance averted the possibility of a major incident.

After berthing earlier that day the ship's master was handed the dock regulations booklet and accepted the provisions therein by signing the acceptance certificate; no request was made for repair work on board. The Chief Officer certified shortly afterwards that all provisions of the Ship/Shore Safety Check List were met.

Discharge of cargo commenced at 0345 hours and up to a few minutes before 2100 hours nothing unusual was observed. At 2100 hours, however, the mobile security patrol guard on the shore noticed flashes aboard the vessel at the stern. He went aboard, found and stopped the welding which was in progress. The unauthorised work had apparently been instigated by the vessel's Chief Engineer without the knowledge of the Chief Officer.

[near miss]

Lessons

Following this incident a strong protest was made to the owners of the vessel.

Source : ICHEME

Location : ,

Injured : 1 Dead : 0

Abstract

On 19th January, a contractor's employee was operating a jackhammer to excavate for the installation of a new pump bed on the No. 1 Crude Unit. Whilst squaring off the excavation the drill slipped and penetrated the grouting on top of a cable trench, piercing a 3,300 volt cable. The jackhammer operator sustained only a slight shock.

A pump bed already existed, but to allow the installation of a larger pump, this bed had to be removed and another, bigger one, made. The work was being done by contractors, who had already installed a similar bed on the No. 2 Crude Unit.

The contractor arrived on site at 08.00 hours and enquired if an excavation permit was available.

Finding that the permit had not yet been issued he contacted the construction supervisor, who arrived very shortly with the 'permit'. The contractor witnessed the signing of the Site Acceptance by the supervisor, who then took the contractor to the job and explained what was to be done, and the precautions to be taken. The contractor marked out three sides of the excavation, but not the fourth side (the south side) which was the side on which the jackhammer was working when the 'near miss' occurred. The contractor remained on site until the bulk of the excavation was completed and told his employees that there was no need to go any nearer the cable trench, as sufficient paving had been broken out. The contractor then left the refinery. The jackhammer operator decided then to square off the corners of the excavation, and whilst he was doing this the drill slipped, and penetrated the cable trench and the cable. When the drill hit the cable it tripped the pump being supplied by the cable. Unit operating personnel immediately investigated, stopped work on the excavation, and had the pump isolated at the sub-station. Repairs were made and only a marginal loss of production resulted.

An investigation was completed it was found that:

1. The recognised procedures, both in the issue of the 'permit' and drawing, and the subsequent briefing of the contractor by the Construction Supervisor had been followed.
2. Adequate drawings had been supplied to the contractor.

[excavation damage, operator error, construction]

Lessons

The following recommendations were made:

1. The use of a jackhammer in close proximity to electric cables is strongly not recommended, because precise control is not possible with this tool.
2. The grouting above the cable trench was sub-standard and should have been replaced when this was known.
3. The 'permit' should have been more detailed.
4. Where concrete is broken in close proximity to electric cables the machine should be capable of precise control.
5. 'Permits' require to state in more detail the hazards associated with the job, and the limitations to be imposed because of these hazards. Contractors' employees should be permitted to read the 'permit' when supervision by the contractor is not continuous.
6. Cable trenches should be protected with timber in the vicinity of the excavation.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A small fire occurred at the end of a barge jetty. No one was injured nor any damage suffered, but it was a near miss.

Welding work begun on 11th January had been stopped on 13th to allow a barge to be filled with white spirit.

On the morning of the 14th, after a check of the area by one of the safety department staff, the work restarted. It consisted of welding some access ladder fittings at the jetty head. The hot work permit laid down certain conditions:

1. The work area should be clean with a fire extinguisher in place
2. No loading or discharging of motor spirit to be allowed within 30 metres of the welding site
3. Gas tests to be made, pipelines to be full to the shutoff valves, safety belts to be worn by workers, notification of the work to the port authorities.

The safety worker left the area at 09.30 hours. At 10.30 hours the work began and a fire developed on the surface of the water caused by light hydrocarbon material igniting from weld sparks. The welder who was wearing his safety harness was suspended for an instant in the flames. He managed to move away quickly and helped with the fire fighting. All loading/unloading operations on the jetty were stopped until the fire was finally extinguished after 3 re-ignitions by the use of 6 x 10 kg. and 1 x 40 kg. dry powder extinguishers and 1 x 50 litre foam extinguisher.

[fire - consequence]

Lessons

[None Reported]

107191972

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An engineer was inspecting the inside of a gas pipeline. He was wearing a face mask with an air supply from the plant's compressed air system by means of a long hose. When he had walked about 60 metres into the pipe, his mask suddenly filled up with water. He tore it off, held his breath and managed to escape. [inspection, contamination, near miss, installation inadequate]

Lessons

The air line supplying the face make had been connected to the bottom of the compressed air main instead of the top. Water had collected in the air main.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A cooling water pump failed. This near miss occurred when the steam turbine driver of a cooling water pump broke up at high speed. A sheared coupling and failure of the emergency butterfly valve to arrest the overspeeding caused extensive damage to the turbine. Plant personnel were lucky not to be struck by flying pieces of metal. The fault lay in the mechanical inoperation of the overspeed valve.
[pump failure, valve failure, damage to equipment, mechanical equipment failure]

Lessons

Personnel are not always aware of the potentially destructive force of steam and require reminding of its dangers from time to time.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

On 12th October, 1971 at 14.00 hours a near miss occurred which could easily have been a serious incident.

A shift fitter was told to obtain a Work Permit to allow maintenance to be done on the inboard seal of the distillation unit's residue pump P2 which had already been isolated in anticipation.

After he had received the Permit he went to the alternative residue pump P1 (not near the other pump P2) and began disconnecting the seal oil line coupling. Because this line was in use and under pressure, hot oil at circa 325 degrees C (617 degrees F) spurted out. The man immediately reported this escape to the control room by the tannoy/ talk-back system stating then it was from pump P2.

The operators initially ran to this pump but then reached the leaking pump, isolated it and drained down the oil while keeping snuffing steam in play from hand lance.

It was extremely fortunate that no spontaneous ignition of the escaping oil occurred since its temperature made this likely.

The fitter had been employed in his present capacity for four years and was well acquainted with the process units. He had no explanation for his going to the wrong pump other than that he himself had put a test seal into pump P1 a few days before and may have mentally assumed this to be the seal needing attention.

[operator error, spill]

Lessons

The incident emphasises how important it is to ensure the safe handover of plant and equipment from operating to maintenance personnel since this interface is well known to be the point at which events leading to an accident can occur. Clearly marked items of equipment reduce the risk of error, but the presence of operating personnel at the job site for handover is a more effective safeguard.

Source : LIVERPOOL POST AND ECHO.

Location : Liverpool, UK

Injured : 0 **Dead :** 0

Abstract

About 600,000 gallons of naphtha were released (possibly by vandals opening valve) from a plant storage tank. The naphtha seeped through the ground, into a sewerage system and into the nearby river. A white mist hovered over the area of the tank, river traffic was stopped for 10 hours. Fortunately weather conditions helped to safely disperse airborne naphtha. The majority of the liquid naphtha was recovered from the river by use of a boom, and then pumping to a barge. A large residual area was subject to warnings about smoking, use of naked lights etc.

[gas / vapour release, vandalism, spill, storage tanks, near miss]

Lessons

The documents do not give any direct information about action taken beyond the immediate remedial measures.

At the time, there were public calls for:

1. Locking of all tank valves, to guard against interference by vandals.
 2. Closure and/or relocation of the storage depot.
-

1000315 February 1971

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A rail transportation incident. A train consisting of five HCN railcars and protected at each end by two barrier wagons, was negotiating hand points at exchange sidings when one of the tank cars was derailed. As a result emergency procedures were initiated between the rail company and the local fire and police services. After a thorough investigation it was established that the tank car was free of leaks. The derailed tank suffered minor damage to tie rods, axle guard, step ladder and buffer bell.

[hydrogen cyanide, derailment - consequence, near miss, mechanical equipment failure]

Lessons

The cause of the incident was attributed to defective hand points, which were suitably repaired following the incident.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A mechanical seal, on an ethylene/propane pump, failed, resulting in the release of about 90,000 cu.ft (n 2500m3) of hydrocarbon vapour to atmosphere. The area contained lighted flare stacks and the fact that no fire resulted, was probably due to the favourable wind direction at the time. The failure was due to the fracture of two stud bolts that retained the mechanical seal plate, allowing the latter to move sufficiently to permit escape of gas. The bolt failure was due to stress corrosion. The stud bolts were manufactured from steel with good mechanical properties at normal temperatures, but not at lower temperatures which had sometimes been experienced.

[mechanical equipment failure, gas / vapour release, near miss]

Lessons

1. Studs on all such pumps changed for a steel suitable for low temperatures.
 2. Consideration given and action taken on re-siting of flows so as to keep them away from potential hydrocarbon leaks.
 3. Automatic plant shutdown, for critical areas to be considered.
 4. Improve maintenance schedules to reduce risk of component deterioration.
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A road transport incident. An LPG tank truck containing about 400 gallons of propane was preparing to make a delivery to a restaurant in a town centre. The driver ran out to the hose and connected it to the storage tank, and then opened two outlet valves to the tanks on the vehicle. With the engine running, he then engaged the power take-off to the pump. At that moment, a reinforced rubber connection ruptured and liquid propane began to leak directly under the truck. (Damage to the hose was found to be due to abrasion).

The driver disengaged the pump drive, but was unable to shut the discharge valves because of a bent linkage. Even with the pump stopped, propane continued to leak at the rate of about 3 gallons per minute. (Excess flow check valves did not operate because of the relatively low flow rate).

The fire department was called: they closed the street and stood by with fire hoses, but did not disperse the vapour with water sprays. The area was evacuated and electricity supplies isolated. An attempt to push the truck to an isolated area failed, because the brakes had become frozen. After about 2 hours, all the propane had leaked out and the empty truck was driven back to the plant.

[unloading, spill, near miss, gas / vapour release, hose failure, valve failure, safety procedures inadequate]

Lessons

The incident could clearly have had very serious results.

Recommended NFPA practice calls for the dispersal of LPG vapours with water sprays.

Both the flexible connection failure and the inoperable shut-off valves showed inadequate inspection and maintenance.

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A hydrogen explosion occurred in the packing gland area of a large (4,500 hp) reciprocating compressor on an ammonia plant. The incident arose from a piston rod failure. The ensuing fire was quickly extinguished and no one was injured. A 20 kg cover plate narrowly missed one operator.

The precise reason for the piston rod failure is not known. Once the piston rod had failed, it distorted the packing and allowed gas to escape into a distance piece pocket, where the explosion occurred. This pocket was not purged, and air is normally present: thus an explosive mixture was formed with the leaking hydrogen (synthesis gas). The source of ignition was probably a hot metal surface.

The cover plate was attached by two bolts only. It was felt that the explosion might have been even more serious if all ten bolts had been in place.

[normal operations, damage to equipment, near miss, mechanical equipment failure]

Lessons

It was decided to leave the distance piece covers off all cylinders where possible, thus allowing the ventilation in the area to reduce the chance of building up an explosive concentration if leaks occurred.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An incident occurred in a benzoyl peroxide paste building at an organic peroxide plant when decomposition of benzoyl peroxide and dimethyl phalate paste were added together and mixed in a mixer bowl. Fortunately no fire occurred.

The decomposition occurred due to heat generated by friction between the scraper blade and the metal bowl. Inside the mixing bowl friction marks were found some of which matched the scraper blade.

An operator received slight burns in the incident.

[burns, near miss, mixing

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A flare stack serving a major group of units collapsed during a wind storm. The stack was 200 feet high and supported by 2 sets of 3 guy wires 120 degrees apart and secured by 4 standard clips each end. It was a standard guyed flare stack. At the time of failure, records indicated the average wind velocity to be about 35 mph with gusts of 57 mph from a SW direction. The lower guy failed and distorted elastically. In snapping back, a high reaction force was given to the upper guy which then had to carry the total wind force. The upper guy failed and caused it to fail as a column.

The collapse could have resulted in power failures to the system serving the refinery which would have released large volumes of gas to the broken flare. [strong winds, near miss]

Lessons

It was concluded that the flare collapsed as a result of a guy wire slipping out of the clamped end sector. This was probably caused by insufficient tightening of the clips.

Since the event, a check of the torque on the U-bolt claps was arranged. Ground splices were tightened to between 80 and 100 foot pounds whereas stack connections were tightened non-uniformly and with torques as low as 30 foot pounds. Instead of the 4 U-clamps used on the arranged design, 6 cable lumps were attached to every guy wire end. Tightening of nuts on the cable clamps was by torque wrench. The arrangement of ladders on the new stack will permit inspection of the guy connection to ensure they remain tight.

Source : ICHEME

Location : , WEST INDIES

Injured : 0 Dead : 0

Abstract

In a unit for hydrogenating benzene to cyclohexane the temperature rise in the reactor was limited by recycling a large volume of cyclohexane product. This was essential because if the temperature rose more than 25 degrees C, runaway demethylation would start.

The protection against a runaway was a set of 16 thermocouples in the reactor connected to a multipoint recorder with a shutdown trip.

However, when the recycle pump failed the slow response of the thermocouples and the 2 second per point speed of the recorder permitted a runaway before the shutdown was actuated. One reactor bed temperature went off scale at 500 degrees C and only rapid depressuring of the reactor prevented a rupture.

[hydrogen, exothermic reaction, reaction vessel, catalyst, near miss, reactors and reaction equipment, pump failure, runaway reaction, design inadequate]

Lessons

1. When designing safety shutdowns the rate of response of the detection system must be allowed for.
 2. The best shutdown systems measure the primary cause of the fault rather than its consequences.
 3. The unit was fitted with an additional shutdown which measured the ratio of the recycle cyclohexane flow to the benzene charge flow. It was triggered when the ratio fell below a safe level.
-

Source : ICHEME

Location : , WEST INDIES

Injured : 0 **Dead :** 0

Abstract

The pressure on a distillation column was controlled by a hot vapour bypass round the air cooler used as an overhead condenser. The hot vapour bypass joined a horizontal section of the air cooler outlet piping. This caused a hydraulic hammer which was so severe that light weight fireproofing was shaken off the supporting structure and the operating linkage on the vapour bypass butterfly valve broke.

[naphtha, air cooler, butterfly valve, near miss, design inadequate, water hammer]

Lessons

The vapour bypass return was relocated to the downpipe just above the overhead receiver. An alternative would be to connect it directly to the top of the overhead receiver.

Source : ICHEME

Location : , UK

Injured : 0 **Dead :** 0

Abstract

On a vacuum unit processing the residue from a naphthenic crude, heavy corrosion-erosion nearly perforated the heater discharge header where the flow from the pass outlets impinged on the wall. This pipe was lined with stainless steel.

[hydrocarbon, shutdown, pipe, near miss, incorrect material of construction]

Lessons

[None Reported]

9171 27 February 1959

Source : OREGON. LEWIS NEWSPAPER.

Location : , USA

Injured : 0 Dead : 0

Abstract

100 US gallons of LPG had been transferred to a small road tanker from a large delivery truck when the hose was accidentally disconnected by a quick release coupling. The supply could not be isolated but water was sprayed onto the flowing liquid until all 700 US gallons were safely discharged in 35 to 40 minutes without ignition occurring. The flow of LPG was too low to cause an excess flow valve to operate.

[material transfer, near miss, mechanical equipment failure]

Lessons

[None Reported]

9169 14 November 1958

Source : NFPA QUARTERLY, 1961, OCT. LP GAS FIRES & EXPLOSIONS.

Location : California, USA

Injured : 1 Dead : 0

Abstract

A road transportation incident. A road tanker was in collision with a car causing the tanker to overturn, knocking out its plug. Gas flowed into a storm drain 15.2 metres downhill. Firemen were able to spray the length of the drain and plug the hole with a wooden plug. A fire chief, covered by spray streams and wearing self contained breathing equipment and rubber gloves, expertly drove the tapered wooden plug into the opening, using a rubber mallet. The road tanker was then set on its wheels by heavy duty construction equipment and removed to a location where the LPG could be transferred to another tank.

Fortunately a fire did not occur, but its ominous threat caused anxious moments.

[spill, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : , WEST INDIES

Injured : 0 Dead : 0

Abstract

On the first shutdown of a catalytic reformer unit, hydrogen blistering was found in the top manway nozzle of one of the four reactors.

On checking the pipe, the nozzle was found to be made from mild steel.

The other seven nozzles were all chrome-moly alloy as specified and as shown in the material certificates.

[reactors and reaction equipment, near miss, incorrect material of construction]

Lessons

1. Even with reputable manufacturers some independent checking of quality control is required.
 2. Inspection of a new process unit as its first shutdown should be very thorough.
-

Source : ICHEME

Location : , WEST INDIES

Injured : 0 **Dead :** 0

Abstract

A large fractionator operating at just above atmospheric pressure was used to split a heavy naphtha cut. The column was tall and the condensers were well above the overhead receiver.

When the unit was commissioned this fractionator gave all the symptoms of tray flooding despite being operated at well below design throughput. The pressure reading on the overhead receiver was normal but on installing a pressure gauge on the reboiler return, the pressure was 0.35 bar A. The column was hurriedly shut down because it was not designed for vacuum service.

The explanation was that the 3" vent hole at the top of the drop pipe in the overhead receiver was not there. In its absence the pipe from the overhead condenser acted as a barometric leg. There was no permanent gas present and so the vacuum could be pulled without need for an ejector. It was only good fortune that the column did not implode and collapse.

[commissioning, distillation, pressure vessel, near miss, incorrect equipment installed, inspection inadequate]

Lessons

1. An independent final check to be made on new plant preferably by a process engineer, before it is boxed up and commissioned.
 2. Any even slightly unexpected response on a new plant requires immediate and careful analysis.
-

110461952

Source : ICHEME

Location : , WEST INDIES

Injured : 0 Dead : 0

Abstract

In checking the safety valve logic for proposed modifications to one of a pair of coking units an existing fault was found. A cross connection had previously been installed between the distillation tower overhead system of the two units. In doing so a valve had been installed in the line from the condenser to the overhead receiver. This isolated the receiver from the safety relief valve on the fractionator which had originally protected it. Now there was no protection for the receiver in case of fire if the valve was closed.

[design or procedure error, near miss]

Lessons

When any modification is made to a unit, however small, the safety implications must be reviewed as carefully as for a new unit.

Source : ICHEME

Location : , WEST INDIES

Injured : 0 **Dead :** 0

Abstract

In checking the safety relief valve logic for proposed modifications to one pair of coking units an existing fault was found. A cross connection had previously been installed between the distillation tower overhead systems of the two units. In doing so a valve had been installed in the line from the condenser to the overhead receiver. This isolated the receiver from the safety relief valve on the fractionator which had originally protected it. Now there was no protection for the receiver in case of fire if the valve was closed.

[gate valve, near miss, hydrocarbons, design inadequate]

Lessons

When any modification is made to a unit, however small, the safety implications must be reviewed as carefully as for a new unit.

Source : ICHEME

Location : , WEST INDIES

Injured : 0 **Dead :** 0

Abstract

Modifications were being carried out on an old separation unit. This involved welding a new pipe support to an existing structure which was fireproofed.

On chipping away the concrete fireproofing, the 'I' beam was found to be badly corroded. The whole structure had to be replaced.

[corrosion, construction, near miss, water]

Lessons

1. Concrete fireproofing has to be of a high standard and reinforced with steel mesh to prevent cracking.
 2. Where the upper levels of a structure do not require fireproofing a mastic seal should be applied where the steelwork leaves the top of the fireproofing.
 3. A reinforced concrete structure has some advantage over fireproofed structural steel in this respect.
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A nitrogen system was being used to purge the insulation-filled space between the walls of a new refrigerated storage tank for butane. At the same time, the nitrogen supply was being used by welders to provide an inert gas blanket. A welder found that the #inert# gas was actually combustible. All work was stopped and no accident occurred.

It was found that the nitrogen supply was contaminated by a combustible gas. Although at first this was believed to be butane, tests showed that it was mainly hydrogen.

The source of the hydrogen contamination was found to be a catalytic reforming unit. Nitrogen had been used to purge this unit during start-up, and procedures required that positive isolation should take place immediately after purging by the insertion of slip plates. In this case, initial isolation was only by valves, and positive isolation did not take place until 24 hours later. In the interval, hydrogen pressure exceeded nitrogen supply pressure and the contamination occurred.

[welding, near miss, operation omitted, blind/spade/slip plate, purging, storage tanks, refrigeration unit]

Lessons

The incident reinforced the importance of complying with existing procedures - ie the immediate positive isolation of nitrogen supply lines after purging process units.

Source : LOSS PREVENTION BULLETIN, 114, 19.

Location : ,

Injured : 0 Dead : 0

Abstract

Sparks fly during process transfer. An aqueous corrosive solution was being unloaded from a deck tank into totes.

At the time of the incident, the unloading of the deck tank was nearly complete. Nitrogen was flowing through the pipeline. The operator noticed 15 cm sparks between the metal straps on the tote and the metal lid which holds the dip pipe and the vent hose.

[near miss]

Lessons

The following conclusions were made:

This incident illustrates the static hazards of top unloading from a pressurised vessel especially into a lined vessel.

Since the corrosive solution is not flammable, the consequences of this incident were not severe.

The easiest way to prevent the static discharge is to ground the pipeline, the tote, scale and the deck tank to earth. Continuity checks should be carried out on a regular basis to ensure the integrity of the system.

Source : LOSS PREVENTION BULLETIN 154, 15-18.

Location : ,

Injured : 2 Dead : 0

Abstract

A near miss incident. An electrician was overcome whilst refitting a motor to a packed tower containing waste gases. The electrician was rescued but was unconscious as he was pulled away from the scene. The incident occurred when two workers including the electrician were carrying out repairs to a pump connected to the water recirculating system at the base of a tower.

When the pump was originally fitted, the on-site head of the project team had made an informal risk assessment of the task, he devised a system of work involving isolating the tower from the waste gas header by means of the non bubble-tight knife-gate valve, and opening the water-sealed pressure relief vent on the side of the tower.

The intention was that the gas from the bottom of the tower and any gas leaking through the isolation valve, being slightly lighter than air, would leave by this vent.

The assessment was not recorded, and the system of work was communicated verbally in passing, as the team leader and the electrician did the work together.

Two days later the pump failed and the electrician and student were asked to repair it. They closed the knife-gate valve to the gas header, but forgot the key step of opening the water-sealed vent. There was no incident during the removal of the pump. After doing this and blanking the flange they refilled the tower with gas to maintain a positive pressure and so prevent air leaking in.

They returned later the same day to reconnect the repaired pump. The flanged pipe connection to the pump was within inches of the ground so they had to work in their hands and knees in and around the space between the conical space inside the tower and its skirt. After twenty minutes or so both started to feel ill. They decided to get out, but before they did so the student noticed that his colleague had become motionless, staring and unresponsive. He tried to rouse him, then pulled him out into the fresh air. The electrician recovered full consciousness after a few minutes but it is likely that the prompt action of his colleague saved his life.

Effects of the gas

Te symptoms of the electrician, and the speed with which he recovered, indicated that lack of oxygen was the likely cause of his loss of consciousness.

However the ill feeling felt by both showed that there were toxic effects also.

The composition of the cocktail of gases:

Gas constituent% composition

| | |
|--------------------|---------|
| Nitrogen | 61.7 |
| Carbon monoxide | 14.8 |
| Carbon dioxide | 3.4 |
| Hydrogen | 18 |
| Methane | 0.9 |
| Ethylene | 0.4 |
| Argon | 0.8 |
| C20 | 0.1 |
| Hydrogen sulphide | 455 ppm |
| Carbon disulphide | 57 ppm |
| Carbonyl sulphide | 34 ppm |
| Sulphur dioxide | 0 |
| Hydrogen cyanide | 460 ppm |
| Oxides of nitrogen | 0 |

[entry into confined space, asphyxiation, toxic gas, safety procedures inadequate, management system inadequate, injury]

Lessons

The following steps were introduced after the incident, and would have prevented the accident if they had been in place from the start:

1. Clear, unambiguous accountability for the overall management of health and safety of the project.
2. An overall plan as to how health and safety would be ensured given the hazards. This should have identified who would access risks and systems of work, what competencies were required and what categories of work required the extra control of a permit-to-work.
3. Clear information, ground rules and instructions known to be understood by all people involved, including what the main hazards were and who was authorised to do what.
4. Written instructions for complex or safety-critical tasks, supported by permits-to-work to provide positive confirmation that the right precautions were in place for the most dangerous tasks.
5. Clear top-down expectation that safety standards would not be lowered under deadline pressure and realism in setting the deadlines.
6. Inspections or audits to make sure that management controls were adequate and being complied with.
7. A regular review of health and safety.

It was unclear that incorrect assumptions had been made about the nature of a 'confined space'. Vessel entry is an activity that most people in industry recognise as dangerous.

Earlier in the project when entry inside the packed tower had been necessary, it had been purged and the site confined-space permit procedure had been correctly followed. The space under the packed tower was not considered 'confined' because it had four openings and did not look like a vessel. However it was clearly an area where toxic gases might accumulate, so the same kind of procedure should have been followed.

Source : LOSS PREVENTION BULLETIN, 023, 136-137.

Location :

Injured : 0 Dead : 0

Abstract

The hydraulic oil system of a machine had to be modified. The system can reach a pressure of 3600 p.s.i. The man carrying out the work asked what was the safe working pressure of three eighths of an inch copper pipe. He was told 10,000 p.s.i. and went to withdraw three eighths of an inch copper pipe from the stores.

The three eighths of an inch copper pipe of 10 swg wall thickness was obtained in a grade suitable for use at 10,000 p.s.i. However, the three eighths of an inch copper pipe stocked in the company concerned is 18 swg wall thickness and its safe working pressure was only 1555 p.s.i.

Fortunately the mistake was discovered before the system was put on-line.

[maintenance, incorrect material of construction, near miss]

Lessons

Always specify the grade, thickness, heat treatment and other relevant properties so that only the correct material is used.

3107 Date Unknown

Source : LOSS PREVENTION BULLETIN, 111, 1.

Location :

Injured : 0 **Dead :** 0

Abstract

A flare stack to header connection was a flanged joint in the horizontal section of the header. The steam assistance had been left on after a flare of propane gases. The flame followed down inside the flare and burnt at the flange, this in turn heated the section to a dull red heat clearly visible to the naked eye. It was fortunate that the flange was in the lightly stressed horizontal section. Had it been in the vertical section, the stack could have suffered systematic collapse. If this had happened it may have been impossible to shut down the plant safely. Near miss.

[fire - consequence, processing]

Lessons

[None Reported]

11494Date Unknown

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

An electrician suffered superficial burns to his face when he was sprayed with electrolyte while removing a plastic sealing cap from a nickel cadmium battery. He was protected from injury to his eyes by the fact that he was wearing glasses at the time.

[near miss]

Lessons

It was the practice of the factory which manufactured the batteries to seal them immediately after charging, without allowing any time for entrained gases to ventilate. This meant that pressure was able to build up within the battery, causing the electrolyte to spray out when the caps were removed.

Source : LOSS PREVENTION BULLETIN, 121, 20-21.

Location : ,

Injured : 0 Dead : 0

Abstract

During a planned power outage, an electrician was nearly electrocuted while performing circuit testing. Although power to the feeder system for the unit where the electrician was working was initially turned off, it was turned on just before the connected cables to perform the test.

The supervisor of the operation was located at the main substation and carried two radios with different frequencies for communicating with construction and electrical crews. Electricians at the water treatment plant (feeders 2 and 3) finished their testing and radioed to the supervisor at the main substation that they were done. The supervisor cleared locks and tags for feeders 1, 2, and 3 and announced over the radio that the feeders were being re-energised. The crew at the boiler plant did not receive this message and continued testing. The result was an electrical arc when the electrician tried to connect a lead to the fuse holder at the boiler plant unit substation. Fortunately, the worker was not injured because he was wearing high-voltage gloves and safety glasses, other workers at the same location were not similarly protected.

Rather than use the radio, the crew leader at the boiler plant drove to the main substation to report the incident. Meanwhile, the electrical arc had tripped the breaker for feeder 1 at the main substation. Because this is fairly common after an outage, personnel at the main substation followed procedure and re-energised the breaker, since they had not been notified of the incident at the boiler plant.

Because he was wearing appropriate protective gear, the accident was not fatal. Near miss.

[electric shock, electrical]

Lessons

1. Procedures for pre-job briefings and proper lock and tag procedures should be followed meticulously.
 2. Communication complications for job supervisors should be minimised when safety-critical tasks are being performed.
 3. Programme of training in formal communications for safety-critical tasks should be developed.
 4. The need to report incidents without delay should be emphasised.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A 100 tonne capacity storage sphere was overfilled with butane.

An independent high level alarm had recently been installed but due to teething troubles operatives regarded it as unreliable indication of maximum level. On the night of the incident, the alarm activated at 58% according to the level recorder.

Subsequent investigations found that in fact it had activated at 68% because of a fault with the level instrument/recorder which was registering a level 10% lower than it actually was.

The operator then believed that there was time to carry out other tasks before there was a need to check the level again.

However due to an increase in flow of butane from the hydrocracker, the sphere overflowed before the operator had returned to check the level again.

It was very fortunate that no ignition occurred and that the resultant vapour cloud dispersed very quickly due to the wind.

Refineries are requested to review the reliability of level instrumentation, particularly the frequency of testing and operating procedures, associated with LPG storage vessels.

[gas / vapour release, level meter/control, instrumentation failure, near miss]

Lessons

[None Reported]

7703 Date Unknown

Source : SAFER PIPING, ICHEME, SAFETY TRAINING PACKAGE, 012, 4.61.

Location : ,

Injured : 0 **Dead :** 0

Abstract

During routine maintenance of an ethylene plant, cleaning activities required the isolation of a seawater cooler. Complete isolation of the heat exchanger was achieved by providing the inlet and outlet valves with spectacle blinds. While one of the valves was being unbolted the pipe fitters heard a crack. The lower flange of the 350 mm (14 inch) valve had cracked over 300 degrees of its circumference. Fortunately the crack was on the non-pressurised side of the valve preventing any major leak of propylene. The upstream pressure was approximately 13 bar. Near miss.

[flange failure]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 127, 11.

Location : ,

Injured : 0 Dead : 0

Abstract

An incident occurred on a heat exchanger bellows which was supplied with an external support ring to give support to the convolutions against internal pressure while allowing the bellows to expand with rise in temperature. The support ring was removed and as a result the bellows became deformed. Fortunately, this was observed before serious fatigue failure occurred. Near miss.

Lessons

The following conclusion was made:

Manufactured equipment should not be modified without first taking expert advice.

7804 Date Unknown

Source : BARTON J AND ROGERS R, CHEMICAL REACTION HAZARDS, 2ND EDITION, ICHEME, 1997, APPENDIX 1, 186.

Location :

Injured : 0 **Dead :** 0

Abstract

A cooling water supply to a condenser was blocked by pebbles and the operator did not turn on the emergency cooling system to the reactor jacket. However, when the runaway started the reactor contents were safely emptied to a dump tank. Near miss.

[runaway reaction, reactors and reaction equipment]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A plant inspector was ascending to the top platform of a debutaniser column when the platform gate at the entrance from the ladder came loose from its fixing to the platform handrail.

He almost lost his footing, but managed to catch hold of a ladder rung. Injury was fortunately restricted to the shock of the incident.

Investigation showed that it was the welding of the gate hinges to the handrail that had cracked, which came loose as the inspector opened the gate to the platform.

Following the incident a major programme to check all platform gates was instigated

It is thought that this gate and possibly others may have been overlooked during inspections, leaving a potential for a serious injury or a fatality.

[weld failure, inspection inadequate, tools & access equipment, near miss]

Lessons

On most plants there are a limited numbers of inspectors compared to the large number of inspections required and it therefore helps to involve others in the reporting of obvious abnormalities as soon as possible. To this end the use of a routine check list for 'visual' inspections can be advantageous, leaving the inspectors to carry-out more detailed checks, for example on weld attachments.

Source : LOSS PREVENTION BULLETIN, 122, 19-21.**Location :** ,**Injured :** 0 **Dead :** 0**Abstract**

While charging acrylonitrile (AN), a reactor operator noticed a yellowish colour in the AN. A sample from the AN storage tank was tested for inhibitor concentration and found to be low (16 ppm inhibitor instead of the specified 35 - 45 ppm). Plant personnel added inhibitor and recirculated the AN for 3 to 4 hours. Subsequent measurement the next day indicated a storage tank inhibitor level of 36 ppm.

Two days later a test of inhibitor level indicated a concentration of only 2.5 ppm. Plant personnel fed an additional 50 ppm inhibitor to the storage tank and recirculated. The plant personnel then started a series of eight production batches to use all the suspect AN. An additional 50 ppm inhibitor was added to the storage tank and after tests a low inhibitor level was confirmed. All the AN was consumed within the next two days. While it was being used, no problems were noted during production. Final products met all specifications.

Inhibitor is added to monomer by the suppliers to impart enough stability that onset of polymerisation does not take place during routine storage and handling.

Contamination, heat, lack of oxygen, or age can all result in inhibitor depletion which may lead to unscheduled (runaway) polymerisation.

Near miss.

[charging reactor, lack of stabiliser/inhibitor]

Lessons

As result of the incident, the following actions were taken:

1. The tank was cleaned and inspected internally.
2. A programme of frequent analysis was instituted to ensure the stability of the AN (two samples per week plus every shipment) until consistent results are confirmed.
3. The AN unloading procedure was reviewed.
4. Emergency response procedures for monomer stability problems were documented.

Source : LOSS PREVENTION BULLETIN, 029, 131.**Location :** ,**Injured :** 0 **Dead :** 0

Abstract

This was a near miss incident involving flash boiling of the top layer. The process for manufacture of a rubber chemical involved transfer of the batch to washer followed by washing and separation. An initial separation had been achieved and the water content of the organic layer, additional aniline was added to the batch and the temperature was increased to an indicated 104 degrees C. This was normal practice. After half an hour a separation was achieved and the water layer was visible in the sight glass at the bottom of the vessel. The bottom valve was opened and material was observed to flow into the open catchtank for 10 seconds, then steam and organic layer were ejected through the open manhole of the washer. The washer outlet was closed again but in all three surges took place and the washer operating level in the building was covered by steam.

The incident was attributed to flash boiling of the water layer following disturbance to the layers due to opening the drain valve. It is thought that the water layer had cooled to a greater extent than the organic layer and that the opening of the valve caused some mixing. Later examination of the temperature indicator showed this to be reading 5 degrees C too low so that real temperature after heating had been 109 degrees C, not 104 degrees C, as indicated. [material transfer, low temperature, separation equipment, chemical - organic aniline]

Lessons

Following an investigation a process improvement was implemented to lower the separation temperature, and the means for measuring and checking temperature were also improved.

Source : LOSS PREVENTION BULLETIN, 137, 18.**Location :** ,**Injured :** 0 **Dead :** 0**Abstract**

An ammonia cylinder, which was not connected to any equipment, ruptured on a production plant. No one was injured in the incident, as the incident occurred during a morning break. An investigation into the failure concluded that the cylinder had ruptured due to significant overpressure. It was concluded that the only possible mechanism to obtain the pressure required to cause the failure, was due to thermal expansion of the contained liquid, which indicated that the cylinder had been overfilled.

The cause of the overfilling was investigated and the possibility of overfilling by the supplier was eliminated. On the day prior to the incident, the cylinder was used to refill cooling equipment with ammonia. The investigation concluded that reverse flow from the cooling equipment had occurred.

Following manufacturers guidelines, the cylinder was attached to the floating leveller between the ammonia liquefied and the vaporiser. An error or a malfunction during the refill procedure, a valve not properly closed or leaking could have led to a higher pressure in the level controller, resulting in reverse flow to the cylinder.

[overflow, near miss, processing]

Lessons

The safe use of cylinders is dependent on the correct gas being contained in the cylinder, and not exceeding the recommended, or approved temperature levels. Guidance on the subject comments that if cylinders are connected to equipment which could even momentarily exceed the pressure in the cylinder, measures must be taken to eliminate overfilling. As a minimum, these measures should include the cylinder being weighted after use to ensure the maximum allowable capacity has not been exceeded through reverse flow. Further, suitable training must be given to operators regarding safe procedures while operating cylinders and highlight any monitoring procedures required, to ensure safe operation.

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

Abstract

An 80m length of 24 inch diameter flare line fell down due to the failure of four support hangers.

Serious damage was avoided since the pipe came to rest on a horizontal support structure situated a short distance immediately below the flare line.

The flare line is supported by hangers every 20m about 4m above ground level.

The hanger supports in this case consisted of a frame assembly around the pipe fitted with a roller to allow for longitudinal movement.

The frame assembly was connected to the top structure beam by a steel rod and swivel device.

The swivel construction was designed to take up any transverse movement of the pipe

An investigation into the incident revealed that the support rods had failed due to fatigue fractures caused by alternating bending loads. The presence of corrosion, rust and dirt prevented any movement of the hemispherical swivel device and the roller bars in the support frame. Calculations have indicated however, that frictional forces alone (without the presence of rust etc.) may have been sufficient to exceed the critical bending stresses for the support hanger rod.

[material of construction failure, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A hydrocracker reactor was being emptied whilst under a nitrogen blanket by contractors specialising in inert gas entry. Two of the contractors employees were working inside the reactor with their breathing air supplies being continuously monitored from outside. The breathing air flow to one of the persons inside the reactor was seen to increase significantly which was followed shortly afterwards by a similar increase in the second person's air supply. The men were immediately recovered from inside the reactor without suffering any adverse effect and an investigation revealed that the two breathing air hoses had come into contact with a hot steam line. This line had been cold at the start of the work, but somehow the steam had been turned back on and the reinforced rubber breathing air hoses (tested to 130 bars) were damaged by the heat and started to leak.

[reactors and reaction equipment, damage to equipment, breathing apparatus, hot surface, air system failure, entry into confined space, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

To prevent one solvent contaminating another, a common rundown line to storage from a catalytic reformer needed to be flushed with water at product change-overs.

The rundown line was not equipped with permanent flushing facilities so a canvas fire hose was used with water from a nearby fire main, as a temporary measure.

The receiving tank, sited approximately 3/4 Km away, was already filled to a level of 12.8m with liquid when water was supplied to the hose.

The end blew off the temporary connection and since there was no isolation valve at this point on the line, the solvent poured out.

Approximately 1,000 gallons escaped from the pipe before someone could reach and shut off the isolation valve at the base of the tank.

Although the solvent flowed near a furnace it did not ignite, due to favourable wind conditions and an effective foam coverage applied by the refinery's fire brigade.

[spill, near miss, material transfer]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An incident occurred during the overhaul of a unit. A 15 tonne diesel hydraulic mobile jib crane was lifting a valve down from a vessel when the rope broke. The valve weighed approximately 100 kg and the jib was being retracted at the time of the incident. The investigation was carried out by an independent insurance surveyor, and from the information available it was concluded that the rope broke when either slack rope between the compensating pulleys, or a kink in the rope, jammed between the lower compensating pulley flange and guard. The load did not fall because the end of the broken rope was trapped in the guard bracket at the pulley.

[maintenance, mechanical equipment failure, near miss]

Lessons

Attention should be drawn to the following points which should be checked before lifting plant is permitted:

1. Check that valid crane test and insurance inspection certificates are available for the configuration of the crane specified for the job.
 2. Check that test and inspection certificates are available for all "loose" items, including hook blocks, ropes, slings, shackles, etc.
 3. Check that the supplier of the crane has a `safe system of work which should cover the following additional points before the crane is permitted on site.
 4. Competence of driver to operate the specified equipment supported by documentation;
 5. Examination of `loose' items at site and check that rope terminations are in accordance with good practice
 6. Check of safety load indicator and all other safety devices to ensure that they are functioning properly.
 7. Check of condition of tyres if wheel mounted
 8. Check of ropes to ensure they are spooling correctly on the drum
 9. Check of crane hook to ensure that it is equipped with a safety latch
 10. Check of general housekeeping, e.g. driver's compartment free of loose items such as bolts, washers etc.
-

Source : ICHEME

Location : ,

Injured : 1 Dead : 0

Abstract

An instrument fitter was overcome by gas containing H₂S (hydrogen sulphide) whilst draining down a level controller float chamber on the stabiliser reflux drum on the hydrofiner unit.

The instrument fitter had been requested by the hydrofiner unit operator to check the level indicators of the stabiliser drum.

The instrument fitter isolated the level control float chamber having some difficulty with the top isolating valve, and proceeded to drain the float chamber, to zero-check the instrument. The drain terminated in an open ended pipe at a tundish. The drain line was blocked but the instrument fitter cleared it by hammering. He then smelled H₂S and observed gas bubbling up the tundish. He attempted to close the drain valve before leaving the area and subsequently collapsed.

Fortunately he was observed from the control room, and two operators went to his aid. Another fitter, who was also a volunteer fireman and first aider, was working nearby, and applied resuscitation from a "Kiss of Life" oxygen mask type resuscitator. The gassed fitter made a full recovery.

[near miss]

Lessons

[None Reported]

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

The 700 tonne fuel oil tank was being taken out of service, the fuel oil had been pumped out and 1.5 m of gas oil added for flushing purposes. Circulation commenced and the steam coil was commissioned. Steam was supplied to the coil at 190 psig. Six hours later the operator logged the tank temperature as 66 degrees C and the level at 1.92 m. At changeover of shift, 14 hours from the commencement of the operation, the tank was checked and the temperature was seen at 88 degrees C and the steam valve was supposedly shut-in to a minimum to maintain temperature. The next time the tank was checked, 21 hours from the commencement of the operation, the temperature had reached 110 degrees C and the operator immediately shut off the steam completely.

Almost at the same time the tank ruptured and oil, in the form of a foam, was discharged from the opened shell/roof seam. Most of the oil fell outside the bund and flowed towards the control room entering the drainage system around the main boilers and the condensate return sump. Calculations indicate that approximately 77 tonnes were discharged during the incident. A foam blanket was put on all the oil around boilers, in the trenches and other potentially hazardous areas to prevent the possibility of ignition.

It is probable that the free water in the tank came from a leaking steam coil.

[processing, near miss, high temperature]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Low flow through one of two tube passes in a reboiler furnace caused overheating which fortunately was spotted by an operator before tube failure occurred. He was making a routine furnace visual inspection of the furnace when he noticed that half the tubes were a bright red colour.

The low process fluid flow was caused by the failure of instrumentation.

The differential tapping tubes across the flow measuring orifice in the process fluid line had become choked (believed to be sulphide deposits) giving a spurious high reading. This in turn caused the automatic valve in the feed line to close in. The low flow alarm did not function because its piping/signal was taken from the same measuring device.

The skin temperature thermocouples did however indicate 840 degrees C which far exceeded the design figure of 330 degrees C and the product temperature 751 degrees C when the design figure was 270 degrees C. These high temperatures were recorded on a print-out machine but escaped the notice of the board man in the control room.

[flow rate too low, instrumentation failure, alarm failure, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A contractor's crawler crane was supporting a 13.5 tonne jetty loading arm when the hoist rope of the crane snapped without warning.

Two of the contractor's employees jumped over the jetty guard rail into the water to avoid being struck by the loading arm. Both men were rescued by the safety boat.

The test certificates for the crane were in order and the condition of the crane and the manner in which it was being used conformed with statutory requirements and good practice.

Investigations have not revealed the precise cause of the failure and it appears that the rope may have been inadvertently damaged at an earlier date.

[mechanical equipment failure, maintenance, near miss]

Lessons

Attention should be drawn to the following points which should be checked before lifting plant is permitted:

1. Check that valid crane test and insurance inspection certificates are available for the configuration of the crane specified for the job.
 2. Check that test and inspection certificates are available for all "loose" items, including hook blocks, ropes, slings, shackles, etc.
 3. Check that the supplier of the crane has a `safe system of work which should cover the following additional points before the crane is permitted on site.
 4. Competence of driver to operate the specified equipment supported by documentation;
 5. Examination of `loose' items at site and check that rope terminations are in accordance with good practice
 6. Check of safety load indicator and all other safety devices to ensure that they are functioning properly.
 7. Check of condition of tyres if wheel mounted
 8. Check of ropes to ensure they are spooling correctly on the drum
 9. Check of crane hook to ensure that it is equipped with a safety latch
 10. Check of general housekeeping, e.g. driver's compartment free of loose items such as bolts, washers etc.
-

6407 Date Unknown

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Road transport incident. A butane car was loaded in error with propane, causing the relief valve on the vehicle's tank to lift and necessitating emergency unloading of the vehicle.

Had the vehicle been of dual purpose design it might have gone unnoticed at the time of loading, and a more serious incident could well have occurred when it was off-loaded at the customer's premises.

The mistake in loading was made possible by common manifolding of propane and butane at the loading point.

[near miss]

Lessons

[None Reported]

7078 Date Unknown

Source : LOSS PREVENTION BULLETIN, 022, 104-105.

Location :

Injured : 0 **Dead :** 0

Abstract

A recent survey in one company showed a number of control room doors propped open or tied open with pieces of string. Perhaps the people who had propped them open did not realise why they should be kept closed.

Most control rooms contain sparking electrical equipment. In some of them people are allowed to smoke. If there is a leak of flammable gas or vapours on the planet outside, it is important to prevent this gas or vapour getting into the control room. This is done by sweeping the control room with air. Air is blown into the cracks and crevices in the building. As the air is leaking out, gas or vapour cannot get in. If a door is kept open all the time or a window is broken, the flow of air will not be sufficient to prevent gas or vent gas or vapour getting in.

[near miss, safety procedures inadequate]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 020, 51.

Location : ,

Injured : 0 Dead : 0

Abstract

An incident occurred when a demolition contractor was required to wear breathing apparatus while cutting up an old storage tank. He obtained several large (2,000 ft³) cylinders of medical compressed air from an outside supplier. Finding that these would be insufficient, he sent a lorry with a written order for another cylinder. When the cylinder was brought into use the welder's face-piece caught fire. He pulled the face-piece off immediately and escaped without injury.

It was later discovered that the cylinder was painted black, the colour for oxygen and not grey, the colour for compressed air. This had not been noticed by the stand-by anti-gas man. Clearly, supervisors and anti-gas men should be familiar with the difference between compressed air and other cylinders and should check the colour coding of cylinders before putting them into use.

[storage tanks, near miss, design or procedure error]

Lessons

Compressed air cylinders for use by one company are usually ordered by one organisation on each site. It is a good idea to make Contractors order their supplies through the company and not directly from the supplier.

7026 Date Unknown

Source : LOSS PREVENTION BULLETIN, 019, 3-4.

Location : ,

Injured : 0 **Dead :** 0

Abstract

A road transportation incident. A vehicle delivered to a customer's premises a full consignment of drums containing a highly flammable product. On arrival the vehicle was un-roped and un-sheeted prior to moving into place at the unloading bay. The load consisted of a full layer of drums upright and a part layer of drums "on the roll" and choked. When moving the vehicle into place all the drums "on the roll" fell off. Fortunately none of the drums leaked but a serious fire could easily have occurred involving the vehicle and the customer's premises. Near miss.

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 014, 5-6.**Location :** ,**Injured :** 0 **Dead :** 0

Abstract

Maintenance requested process for a clearance certificate for a job which in the event took well over a month. Work continued uneventfully until finally a vent line had to be removed. This ran from the general area of maintenance work, through a curtain wall and finished outside in an area with other vent pipes. They obtained a mobile crane and were busy working on the vent line when they were stopped.

Because of the danger from 'live' vents, work on the wall is not allowed, unless either the equipment is shut down or the vents isolated. In this incident no such precautions were taken, and it must be classed as a 'near miss'. Had a live vent occurred whilst work was in progress, the men could have been scalded by the vapours ejected or suffered toxic effects. There is also the possibility of ignition of the vapour by the maintenance equipment. The works operates a daily endorsement procedure, which applies to both 'outside' contractors, as well as their own in works maintenance teams. The endorsement is intended to assist process in locating personnel in an emergency and to ensure that should plant conditions change, and so invalidate some or all of the provisions of the clearance certificate, then maintenance are prevented from resuming work.

On the day of the incident the clearance was not endorsed but it is doubtful whether an endorsement would have prevented the incident, the removal of the vent pipe could have taken place at any time during the previous four weeks.

As a result of this incident, the works has stressed the need for both process and maintenance to know the relevant works instruction governing work on the curtain wall.

Lessons

This incident raises the issue of including on one clearance certificate a job that can be split in two, each with different hazards and appropriate precaution, particularly if a long time interval between the two parts is likely and/or the second is only a small part of the overall job. Secondly, the incident illustrates the need for process to check all maintenance operations thoroughly, particularly when the approach for permission to do work originates with the maintenance group. Indeed, if process find it difficult to foresee all the hazards in a long complicated job, then they should not issue a certificate for the whole job but only for those parts that can be fully appraised.

6971 Date Unknown

Source : LOSS PREVENTION BULLETIN, 016, 5.

Location : ,

Injured : 0 Dead : 0

Abstract

A caustic leak from a drain valve left open unintentionally caused corrosion in an electrical line tracing heater. An arc occurred causing the circuit breaker to trip. This was a near miss because the arc was a potential source of ignition in an area that handled flammable materials.

To prevent a recurrence, a hose was connected to the drain point.

[caustic soda]

Lessons

Drain points and sample points should generally be located at ground floor level in caustic and acid handling systems to reduce corrosion hazard to the plant and to reduce the hazard to personnel from splashing and drips. A hazard in the above case.

Source : LOSS PREVENTION BULLETIN, 003, 12.

Location : ,

Injured : 0 Dead : 0

Abstract

A sludge wagon was hired to empty a pit. The driver reported to the works gate. The gateman contacted the plant supervisor and the supervisor arranged for someone to show the job to the driver and stay with him throughout the day.

The next day the driver arrived to finish the job. As this was a continuation of the previous day's job, the gateman allowed the driver to go straight to the plant. The driver knew what to do and carried on by himself. As the pit was nearly empty, he found a ladder, put it in the pit and climbed in so that he could position the hose accurately. The atmosphere in the pit had not been tested and no entry permit had been issued.

Fortunately, the driver came to no harm.

[atmosphere not tested, near miss, permit to work system inadequate]

Lessons

Until this incident, the works staff believed that it was impossible for a visitor to do anything like this. No one broke any rules, or any instructions they had been given, but there was a loophole in the rules.

Source : LOSS PREVENTION BULLETIN, 000, 7.

Location : ,

Injured : 0 Dead : 0

Abstract

Transportation. It was desired to increase the throughput of a pipeline carrying a very flammable hydrocarbon and the Plant Manager decided to increase the pump speed and the impeller size to meet the requirement. It was pointed out to him that as the pipeline was approximately seven miles long, valves at the discharge end should be slow closing to avoid the risk of high pressure waves and the consequent development of 'water hammer'. The Plant Manager claimed that in the past he had closed discharge valves almost instantaneously and had observed no adverse effects. Before the pumps were up-rated, the transfer line was inspected and it was found that 30% of the pipeline hangers had been distorted and 20% of the hangers were not supporting the pipeline, allowing it to hang free. On the subsequent occasion the line might have fractured with serious consequences.

[damage to equipment, near miss]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 007, 1-2.

Location : ,

Injured : 0 Dead : 0

Abstract

On one plant a liquid hydrocarbon is oxidised with air. If the reactor gets too hot, a high temperature trip automatically shuts off the air and opens a valve which dumps the contents of the reactor to a safe place.

Recently, there was a spurious high temperature trip. The air valve closed and the dump valve opened. The trip condition cleared itself, the dump valve stayed open but the air valve re-opened. As a result, the reactor, which contained only a little hydrocarbon, was filled with air and the atmosphere inside became flammable. Fortunately, no source of ignition turned up and the reactor did not explode. The air valve reopened because the solenoid switching the air supply to the control valve would not stay in the tripped condition. The solenoid in question has now been replaced by a latching solenoid so that once the trip has been initiated it will not reset of its own accord.

[instrumentation failure, near miss, reactors and reaction equipment]

Lessons

When designing a trip system, we should always consider what happens when a trip occurs and then the trip condition is removed. As a rule, the trip valve should not re-open automatically.

The specific recommendations and measurements taken as a result of the incidents described are as follows:

1. Design Philosophy and Procedures

- (a) There should be a clear design philosophy for the specification of instrumentation, control and projective systems.
- (b) There should be a through Hazard and Operability analysis carried out on the plant design to ensure that all possible eventualities which could lead to a hazardous condition have been eliminated.
- (c) The reliability of the instrumentation should be assessed quantitatively whenever possible.

2. Design Principles

- a) Generally, the process parameters of direct interest should be measured, and displayed in the right places.
- b) The same measurement should not be used for control and protection.
- c) The possibility of instrument failure must be fully taken into account. It should be ensured that failure of instruments does not produce hazardous conditions.
- d) The action of control loops should be to fail safe.
- e) Instrumentation designed to deal with a fault must not be disabled by the fault itself.
- f) The system must be designed for abnormal as well as normal operating conditions, e.g. start-up and shut-down.
- g) Steam tracing to be provided for instruments liable to freeze.

3. Inspection

All instruments, systems and alarms and trips should be regularly checked under real life conditions. Adequate test facilities should also be incorporated in the system at the design/construction stage.

4. Operators

- a) A process operator has a finite error rate. This can and should be reduced by good ergonomics, but cannot be eliminated.
- b) A process operator should not be used instead of a trip system.
- c) The instrument system should not be allowed to degrade even if the operator seems to compensate for this.

Source : LOSS PREVENTION BULLETIN, 022, 105.

Location : ,

Injured : 0 Dead : 0

Abstract

A contractors labourer pushed a trolley with one flat tyre up to a welders torch which was not in use and proceeded to fill the tyre with gas, the nozzle made a perfect fit.

When the man was stopped and questioned it became apparent that this was a common procedure carried out by many people. Contractors employees near the incident did not consider there was danger in using any of the two gases available, "as they are still confined". Further questioning produced the response from a man that he had", topped up a wheelbarrow and a couple of hand trucks", in the week he had been on the plant.

The trolley was taken to its proper area, all its tyres deflated and refilled with air, the same procedure was carried out with all other hand trolleys etc. fitted with pneumatic tyres.

[design or procedure error, human causes, near miss]

Lessons

[None Reported]

6875 Date Unknown

Source : LOSS PREVENTION BULLETIN, 005, 12-13.

Location : ,

Injured : 0 **Dead :** 0

Abstract

The bellows in a heat exchanger shell was supplied with an external support ring to support the convolutions against internal pressure, but still allowing the bellows to move axially with increasing temperature.

The ring was removed and the bellows were deformed. Fortunately, this was observed before fatigue failure occurred.

[damage to equipment, near miss]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 016, 7-8.**Location :** ,**Injured :** 0 **Dead :** 0

Abstract

Two pipefitters started to repair a leaking hydrochloric acid transfer line and in preparation closed a valve to isolate the flange to be worked on. However, that valve was located downstream from the flange and nothing was done to close off the feed side of the line. Fortunately the line was not pressurised and they were able to break the flange without mishap, but at this point they were not able to complete the job so they left the end of the pipe open and moved onto other work. Meanwhile, at about the same time this work was being done, a shipment of fresh acid was due, but fortunately it was delivered late, and when the line from the tank-wagon to the storage tank was being blown, acid sprayed out of the open end of the line into the road. It should be noted that neither personnel responsible for the acid tank nor the materials management area were aware of the repair work being done, and it was only a matter of luck the pipefitters were not at the open flange when the acid was delivered. Near miss.

[spill]

Lessons

[None Reported]

12375Date Unknown

Source : CHEMICAL HAZARDS IN INDUSTRY, MARCH 2000.; SICHERE CHEMIEARBEIT, JAN 2000, 52(1), 9 (GERMAN).

Location : , GERMANY

Injured : 0 Dead : 0

Abstract

An incident occurred when a forklift truck driver tried to take avoiding action when he unexpectedly met another forklift truck.

The rapid movement of the rear steering wheel caused the truck to hit a kerb, the vehicle spun on its axle and tipped over.

The driver heeded the advice not to jump from the cab in such a situation and stayed put.

Severe damage occurred to the truck but the driver fortunately suffered only from shock.

[loss of control, near miss, damage to equipment, transportation]

Lessons

[None Reported]

12972Date Unknown

Source : LOSS PREVENTION BULETIN 145, 10.

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident. A flanged tee-piece was to be fitted into a nitrogen main on a styrene plant. The line had been shut off, vented and a section cut out. Preparations for welding were in progress when a gas test showed the presence of hydrocarbon gas. A possible incident was avoided by a very rapid response to the situation.
[preparation for maintenance]

Lessons

The following lessons were learnt:

The investigation team concluded that potential hazards were not fully appreciated and that planning and coordination were inadequate. Consequently the lesson learned from this incident centres around the need to adhere rigorously to Hot Work Permits. The importance of having complete and reliable methods of isolation in place is also highlighted by this case.

Source : LOSS PREVENTION BULLETIN, 141, 16-17.

Location : ,

Injured : 0 **Dead :** 0

Abstract

The radioactive source concerned, Cobalt-60, was used to detect the liquid level inside a caustic soda tank. This tank was to be emptied and cleaned prior to inspection. In order to do this, it was first necessary to remove the source. This was done and a plug was placed in the source output. A positive check that the plug was in place was made and the source container placed on the scaffolding that was used for access to the tank top. The tank was then opened up and cleaned.

During inspection the next day, the Inspector picked up the source container, noticed that the plug was missing and replaced the container on the scaffolding. On the next day, a fitter and colleague noticed the plug lying on the floor under the tank. They reported this to their supervisor who arranged for the plug to be replaced. At this stage, it fell out again, thus indicating that it was not a 'tight fit'. It was estimated that the plug had been out for about 24-48 hours. At this point, concern about possible effects of radioactivity were expressed. Calculations were carried out and it was concluded that, in fact, no harm had occurred because the radioactivity levels to which personnel were actually exposed, were very low, due to the age of the source material.

Investigation of the incident:

It is worth stating at this point that this incident occurred nearly twenty years ago. Thus, many perhaps all of the recommended actions will be standard practice today. Nevertheless, it is useful to reiterate them as a guide to good practice in an area with such high potential for serious injury.

[cleaning, entry into confined space, near miss]

Lessons

The recommendations fell into three broad categories: organisational, procedural, and systems.

Organisationally it was recommended that:

1. The site formally recognise and define a post of Radiological Safety Officer (R.S.O.);
2. Responsibility for all radioactive sources - fixed and mobile - be under the R.S.O;
3. Responsibility for compliance with the Radioactive Substances Act - then 1960, now 1993 - be under the R.S.O.

Procedurally it was recommended that:

1. Permits to work on vessels that incorporate radioactive sources must include reference to such sources and to the person(s) with responsibility for supervision of work on them.
2. Plant operating and maintenance procedures must contain appropriate reference to requirements for work involving the source.
3. All relevant operating and maintenance personnel receive appropriate training and instruction regarding sources.
4. Definitions for reporting radioactive incidents be incorporated into reporting procedures. With regards to systems - equipment - it was recommended that:
5. The source might be surrounded by a mesh cage to prevent unauthorised or accidental access during operation.
6. A suitable locking mechanism for the plug be installed.
7. A safe storage place be provided, away from the work area, for source storage when out of use for maintenance.
8. Appropriate equipment for safe transport to and from this storage place be provided.

In addition to all of the above and further to the investigation itself, it is essential to comply with all statutory and advisory requirements regarding the use of radioactive sources. Systems for achieving this can range from the provision of a full-time in-house Health Physics Advisory Service interacting with national advisory and regulatory authorities, principally the National Radiological Protection Board and the Nuclear Installations Inspectorate, to direct contact with these authorities via a small number of persons with defined responsibilities for such matters. Appointment of an R.S.O. as recommended in this case, would be an example of the latter.

Source : LOSS PREVENTION BULLETIN, 021, 93.

Location : ,

Injured : 0 Dead : 0

Abstract

Two minutes after the hydrogen uptake of a batch had ceased, an operator heard hydrogen escaping from a valve on the hydrogen line. The audible alarm sounded and the automatic shut-down system operated stopping the agitator and closing the hydrogen supply valve. The operator acknowledged the alarm, cancelled the horn, then informed his chargehand. He was told by the chargehand to vent down the hydrogenator via the 2 inch manual vent valve. All this was carried out according to procedures, and a potentially dangerous hydrogen leak was successfully limited before it could cause a fire or explosion.

The faulty hydrogen valve was repaired.

[processing, valve failure, near miss]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN 154, 24-25.

Location : ,

Injured : 0 Dead : 0

Abstract

While a man, wearing breathing apparatus, was working inside a tank, the air supply failed. He pressed the air demand valve but no air came out. As he was near to the manhole, he was able to dive out and remove his mask.

A hole was found in the air pipe about 15 cm along the hose from the mask. It was believed that before use, the mask and air line had been hung over a pipe nearby and the air line had touched an unlagged steam tracing line. This had melted the plastic but it did not fail completely until it had been in use for some time. [breathing apparatus, near miss, safety procedures inadequate, entry into confined space]

Lessons

Lesson learned:

Safety equipment should always be carefully checked before use.

Source : LOSS PREVENTION BULLETIN, 026, 45.

Location : ,

Injured : 0 Dead : 2

Abstract

The end of a tank was blown off and killed two men who were working on adjacent equipment.

A tank was used for storing a liquid product which melted at 100 degrees C. It was therefore heated with a 100 psi steam coil (170 degrees C). When the incident occurred the line into the tank was being blown with compressed air at 75 p.s.i.g to prove that it was clear, the usual procedure before moving product into the tank.

The vent pipe was unheated and blocked with solid product, and the air pressure was sufficient to burst the tank (design pressure 5 p.s.i.g). It was known that the vent was liable to choke but this was looked upon as an inconvenience rather than a danger. The people concerned, including the manager, did not realise that the air pressure could burst the tank.

Vents must be adequately sized. In this case, the original 6 inch diameter vent had been blanked off and a 3 inch diameter vent used in its place. This is a case of the inevitable waiting to happen.

If a tank contains material which is solid at ambient temperature, the vent must be heated and inspected frequently.

[storage, operation inadequate] Fatality.

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN 150, 14.

Location : ,

Injured : 0 Dead : 0

Abstract

A bulk tanker of cellulose acetate flake was being discharged into a factory silo, via a pneumatic conveying system, which included a length of flexible hose. The hose concerned was made of transparent PVC, armoured with carbon steel wire to provide reinforcement, and was also claimed by the manufacturer to provide an anti-static feature. The hose had been specially purchased for the job and had been replaced a few weeks previously. The operator who was supervising the transfer noticed that sparks were being generated between the exposed end of the metal armouring wire and the metal coupling. Flake discharge was immediately stopped and an investigation started. The investigation revealed that there was no proper electrical connection between the wire reinforcement and the couplings, thus static discharge built up on the reinforcement as flake was conveyed through the hose. It was recommended that more rigorous procedures should be established to check the electrical continuity of both new hoses and those in use. The use of an interlocked system would be useful so that transfer cannot begin until continuity and earth is provided. This incident emphasizes the hazards involving isolated conductors and the importance of rigorous electrical continuity checking wherever there is a danger of static build-up.

[silo/hopper, unloading, near miss, design or procedure error]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN 149, 24-25,; BBC ONLINE, 9 AUGUST, 1999, (<http://www.bbc.co.uk>).

Location : , OFFSHORE

Injured : 0 Dead : 0

Abstract

A failure by two oil companies to test lifting equipment could have resulted in a repeat of the Piper Alpha disaster, a court was told.

Tragedy on a par with the disaster eleven years ago in which one hundred and sixty seven people died was only averted because the cable hoist a 10.5 tonne liquid nitrogen tank snapped just 3cm from the ground. The two companies involved in the incident were fined a total of £21,000 (1999), for breaches of health and safety regulations.

The court heard how part of the lifting gear, known as a pennant, bore a certificate confirming it had been tested to carry loads of up to 15 tonnes. However, the tests had not been carried out.

A spokesman for the Health and Safety Executive said in the worst-case scenario the incident could have resulted in a massive hydrocarbon explosion.

The incident occurred as the pennant was hooked into the crane and put into use. The tank cleared the deck by only 30mm before the pennant broke and the tank dropped back onto the deck of the vessel. It was lucky that the pennant failed almost immediately. On both the supply vessel and the installation serious structural damage could have resulted. The consequences would have been disastrous for anyone in the immediate vicinity.

Had the tank of liquid nitrogen ruptured it would have formed a gas cloud, which would have suffocated anyone nearby and have corroded any metal it came into contact with. If it had fallen on the supply vessel it could have caused the boat to sink and put the lives of its eleven-crew members at risk.

[near miss, lifting equipment, offshore, human causes, management system inadequate]

Lessons

The installation was in the process of being commissioned with 390 people aboard at the time of the incident.

Had the tank fallen on the installation once it was in production, the consequences could have been disastrous with a major failure of processing and plant and a massive hydrocarbon release with explosion and fire.

(HSE Inspector, Joe Boswell).

13003Date Unknown

Source : LOSS PREVENTION BULLETIN, 148, 9.; CHEMICAL SAFETY SUMMARY, 1978, 49 (195).

Location : ,

Injured : 0 Dead : 0

Abstract

A contractor was instructed to cut into a redundant line and connect it to a pump charge. In the pipe track where the cut was required, two identical lines run side by side and, although the correct line had been pointed out to the fitter, he began to cut the wrong line in error.

The line he cut carried anhydrous ammonia and it was only because he had been told to act carefully that he realised from the first weep of gas that something was wrong.

Fortunately, the ammonia leak was quickly and easily stopped using a clamp and neoprene jointing.

[operator error, design or procedure error, near miss, maintenance]

Lessons

The following recommendations were made:

1. A new permit-to-work system has been introduced which requires identification tags to be located on equipment to be worked on, thus removing the dangers of verbal communication and confusion due to unfamiliarity with the plant, which were considered to be the main contributory causes to this near miss incident.
 2. All gas-carrying lines in the plant have been painted in accordance with the British Standard colour code and are to be labelled with the named contents of each line.
-

Source : LOSS PREVENTION BULLETIN, 147, 21.

Location : ,

Injured : 0 Dead : 0

Abstract

A recently replaced 0.3m chain-operated butterfly valve failed when the chain-operated handwheel, chain guide and chain became disconnected and fell more than 3.5m, narrowly missing a utilities operator opening the valve.

The portion that fell weighed approximately 8kg.

The new valve had been installed during a shutdown to replace a worn chain-operated butterfly valve. The valve had been received from the supplier with the chain operator already installed and was a type specified by the Engineering Standards for this service. Generally, the chain operator was installed by the plant, but had been supplier-installed on some occasions.

The pin holding the chain-operated handwheel in place failed (or had failed during operation at an earlier time) and allowed the handwheel to completely spin itself off the valve shaft. During the investigation, the operator stated that the operation of the valve felt neither stiff nor looser than comparable valves; although it was the first time he had operated this valve since its installation.

The investigation also pointed out that the shearing of pins in this type of valve was not unusual, but no one could recall a chain operator falling as this one had.

Other employees indicated that when a pin sheared they could tell by the very loose feel as they pulled the chain.

An investigation determined that this was a significant near miss and directed that the following actions be taken.

1. Survey the plant for other similar installations
2. Install a split collar with aircraft cable (or other acceptable retainer design) to prevent chain operators from coming off the shaft if the pin shears.
3. Have an engineering analysis conducted on the overall design of this type of chain-operated valve and initiate a change in Engineering Standards, if appropriate.

[valve failure, near miss]

Lessons

[None Reported]

12756Date Unknown

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An explosion occurred during welding operations on a gasoline treating plant. The explosion blew out the manhole cover several feet into the air. No fire occurred.

A small glow from twine tying electric cable was observed after the explosion, which was extinguished with steam.

It is thought that gas escaping through the barrier ignited and travelled through the barrier into the manhole.

[leak, near miss]

Lessons

[None Reported]

12920Date Unknown

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A front end loader fell sideways off a coke pile at a refinery. The incident occurred whilst clearing coke from one side of a storage pile. The front end loader operator started to push coke up into a different area of the pile where the front right tire suddenly dipped down. In an effort to avoid tipping sideways, the operator lowered the bucket hoping to balance the machine, but the bucket landed at an angle to the right, which continued to fall sideways until the machine landed on its right side. The operator unbuckled his seat belt and harness, and then exited the cab upward out of the door.

[storage, transportation, road transport, plant / property / equipment, near miss, operator error]

Lessons

[None Reported]

12917Date Unknown

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident occurred during operation of electrical switchgear at a refinery. The incident occurred when a guidepin caught a 480-volt incoming main feeder cable piercing the cable's insulation as electricians were re-installing a breaker bucket into the busbar of a motor control centre. Plasma was expelled from the front, top and bottom of the switchgear. Fortunately the electrician installing the bucket was wearing a full body 'flash' suit and 'hot' gloves another electrician avoided injury.

The cause of the incident was due to inadequate clearance between the main feeder cables and the starter and breaker buckets.

[maintenance, design or procedure error]

Lessons

[None Reported]

12906Date Unknown

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident. During inspection of marine loading arms on a jetty it was discovered that the insulation flange joints had inadequate resistance to prevent ship to shore current flow.

It was found that the insulation joints had inadvertently been painted allowing the ship and shore connections to be electrically continuous. Fortunately no ignition occurred.

This incident could have resulted in arcing and fire on the connecting and disconnecting loading arm to and from the ship and may well have caused serious injury.

[operation inadequate, design or procedure error]

Lessons

[None Reported]

Source : THE LINK BETWEEN, ZURIC RISK ENGINEERING, ISSUE NO.31, MAY 2000.

Location : ,

Injured : 0 Dead : 0

Abstract

Two explosions occurred one after the other at a milk powder processing plant damaging fifteen silos inside the building and the building itself. Fortunately at the time of the explosion workers were having their break otherwise the incident could have had disastrous consequences. The first explosion occurred in a silo during filling operations. The second occurred in the building itself, fuelled by the large quantity of 'excess' product being vented into the silo building.

The excess product was generated by an overpressure in the silos during the loading operation. This resulted in the product being forced back through the filter at the top of the silo, and into the building.

Both explosions were classic dust explosions triggered by the discharge of static electricity.

The silos were mounted on automatic weigh bridges and therefore not directly on the ground causing poor grounding.

The construction of the walls and roof of the building were of heavy-duty wood fibre and cement sandwich boards with polyurethane insulation. This allowed pressure to build up inside the building before the boards were ruptured by the exploding steel silo that contributed to the force of the explosion.

[silo/hopper, near miss, damage to equipment, process causes]

Lessons

The following lessons were learned:

1. To prevent the accumulation of static electricity, filling and storage equipment should be properly grounded and maintained.
 2. Buildings containing silos with products vulnerable to dust explosions must be located at a safe distance from other buildings. The building material must be lightweight and non-combustible.
 3. Explosion venting must be installed on an outside wall or in the roof. Excess product in the silos to be moved to the outside via a central exhaust system.
-

12885Date Unknown

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A road transportation incident. A near miss incident occurred involving a truck carrying a rack of compressed gas bottles containing hydrogen on the flatbed behind the headboard and ahead of a load of drill-pipe. In the event that the drill-pipe became de-stabilised and moved forward it could have ruptured the gas bottles causing an explosion.

Fortunately the lorry arrived without incident.

[safety procedures inadequate]

Lessons

Transport of mixed loads involving compressed gas bottles in this situation present serious hazards. Compressed gas bottles are under very high pressure and the consequence of a rupture is severe with potential for fire and explosion in the case of flammable gases.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A failure of a high pressure quick disconnect coupling occurred whilst depressurising a well annulus to flare.

The failed coupling was found to contain a large amount of corrosion product and solids contamination around the working parts also a whipcheck attached to the two halves of the coupling was sheared in two. Fortunately no one was injured in the incident.

[offshore, coupling failure, near miss]

Lessons

The following lessons were learnt:

1. Cleanliness and fitting integrity are critical to the safe function of such quick-disconnect hose fittings.
 2. Regular maintenance must ensure suitability for use.
 3. Whipchecks of the correct rating for the duty must be used.
-

12880Date Unknown

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A near miss incident. A carpenter was toe-nailing a scaffold kick plate when the nail flipped up as it contacted a knot after the hammer grazed the head. The flying nail struck his safety glasses, piercing half an inch through; fortunately it did not come into contact with his eye.
[personal protective equipment]

Lessons

This incident illustrates the importance of wearing safety glasses whether at work or at home.

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A sample point failed releasing approximately 400lbs of C4-C6 hydrocarbons to atmosphere. An operator nearby managed to isolate the sample point within approximately five minutes.

Fortunately no injuries occurred.

This incident could have been more serious had the release gone undetected for a longer period, or had the valve come apart while being operated.

An investigation into the failure found that it was not just corrosion that had occurred but the valve was unsuitable for service on a system containing hydrocarbons.

[mechanical equipment failure, gas / vapour release, near miss, design or procedure error]

Lessons

The following recommendation was made:

Make sure the materials of construction are compatible with all possible conditions (as identified during HAZOPS).

12814Date Unknown

Source : QUARTERLY SAFETY SUMMARY, 1969, VOL.40, NO. 158.

Location : ,

Injured : 1 Dead : 0

Abstract

A overpressurisation incident occurred when the lid blew off a road tanker whilst being unloaded.

The incident occurred as the driver climbed onto the roof of the tanker to investigate an air leak. He found that air was escaping from the air release valve at the front of the tanker he closed the valve. Almost immediately after the lid blew off the front compartment of the tanker. The driver climbed down and stopped the compressor. No acid was released in the incident.

An investigation into the incident found that a partial blockage of the relief valve leading to overpressurisation of the tank together with insecure fastening of the lid was the cause of the blow out. The driver was treated for shock.

[unloading, leak, explosion / pressure release, near miss, injury]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A 250 m³ pressure storage vessel was receiving propane and was approaching full, when the release valve shattered. By the time the propane flow had been diverted, the relief valve was full open. Despite a drop in the vessel pressure, the valve did not reseal. The propane in the vessel was now boiling and could not be pumped out due to lack of NPSH. 90 m³ of propane vaporised and was vented to atmosphere before the tank was emptied by connecting it to a vessel at atmospheric pressure. Fortunately, the propane vapour did not find a source of ignition before dispersing. The relief valve stem was found struck in its guides.

[propane, storage, safety relief valve, gas / vapour release, safety relief valve failure, design inadequate, near miss, inspection inadequate]

Lessons

1. Where access to relief valves for inspection is difficult as on large LPG storage tanks, dual relief valves should be fitted on a three way cock. This allows shut-off, inspection and repair of each valve in turn.
 2. Although not proved, the pressure may have risen due to compression of the remaining vapour by over filling. Fitted of a high pressure alarm would warn of this.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A road transport incident. A heavy goods vehicle (HGV) was driven forward whilst a forklift truck driver was still loading a pallet on its trailer. As the forks on the forklift truck (FLT) were under the pallet, the movement of the vehicle pulled the FLT over. Fortunately the FLT driver managed to jump clear before the truck hit the ground and escaped injury. Damage to the FLT amounted to \$3,000 (£1,791).

The HGV was being loaded with finished product to be taken and stored in a warehouse on the site, 50 m from the loading bay. It was being loaded simultaneously from both sides by two FLT's. It is customary for the curtains not to be closed after loading for this short journey.

The HGV driver had been told by one FLT driver that the loading was complete on his side. The HGV driver then walked around the vehicle, noticed that it was not loaded to capacity and assumed there was no more finished product available. He did not close the curtain on the trailer. He got into his cab, started the engine, looked into his mirror and thought that it was safe to move the vehicle forward. His view, however was partially restricted due to the curtain not being closed. After moving the vehicle forward he noticed the flashing light of the FLT at ground level and immediately stopped his vehicle. The other FLT driver loading the pallet at the time, shouted to the HGV driver when he heard the air brake release on the HGV and jumped clear of his cab.

[damage to equipment, near miss, design or procedure error]

Lessons

The following actions were taken:

1. Ignition keys are now removed from the HGVs prior to loading and kept by the lead FLT driver. The keys are returned when the loading is complete.
2. Lead FLT drivers will be formally appointed.
3. Trailer curtains will be closed before any HGV is driven away.
4. Loading points will be clearly identified.
5. Written procedures will be prepared and training will be provided. The procedure will be sent to all contract haulers and shown to all contract drivers on arrival at site.
6. Improved lighting will be installed and additional mirrors will be fitted to nearby stanchions.

Forklift operations require strict management control systems.

Safe loading procedures and driving practices require continual enforcement.

Lessons Learned

Forklift operations require strict management control systems.

Safe loading procedures and driving practices require continual enforcement.

11826Date Unknown

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A fluid catalytic cracking unit reactor suffered internal stiffening where the external stripper vessel was attached to it. During shutdown it was found that the welds that attached the stiffeners had cracked and the reactor shell was distorted in that area. It determined that this was due to different thermal expansion. The stiffeners would heat up and cool down more quickly than the shell during start up and shutdown. A 60cm ring of the shell was replaced and the stiffeners redesigned.

[hydrocarbons, shutdown, inspection, cracking, reaction vessel, catalytic cracker, damage to equipment, near miss, thermal expansion, crack, design inadequate]

Lessons

1. In designing high temperature equipment to minimise thermal expansion stressed start up and shutdown condition must be allowed for.
 2. Careful inspection during shutdowns can detect faults before they lead to a disastrous failure.
-

11816Date Unknown

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

An outboard bearing failed on a large circulating reflex pump, handling 150 degrees C oil. The incident was caused by procedures not being followed. The incident occurred whilst work was being carried out on the bearing housing this involved a standard procedure of closing the pump discharge and suction valves, then depressuring the casing.

This was not followed.

However, the bearing failure was associated with shaft failure. When the bearing housing was released the 1 bar suction pressure forced the 80 mm shaft out of the packing gland. It was fortunate that the subsequent oil leak did not ignite.

[gas oil, maintenance, repair, pump, blowout, near miss, maintenance procedure error]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A short circuit in the fireeye system of a refinery steam boiler caused the shutdown of the system.

Due to the lack of co-ordination in fuses and circuit breakers this caused the shutdown of the other steam boiler.

The incident affected the amount of (lack of) steam operating the hydrogen gas compressor on the catalytic reformer, releasing gas to the flare.

Temperatures were below 0 degrees C and the drain from the flare molecular seal was plugged.

venting, flare stack, overpressure, near miss, safety equipment failure, electrical equipment failure, safety procedures inadequate]

Lessons

1. This incident is a very good illustration of the need for regular audits on safety related equipment to ensure that it remains in working order for long periods when it is not required to operate.

2. In the present case the following steps were taken:

- The centre steam injection system was shut down in cold weather.
 - The molecular seal draw was connected to the fuel gas system so that it could be checked and blown clear on a regular schedule.
 - Methane was injected into the flare system in cold weather.
 - A pressure recorder was installed on the flare header.
-

11806Date Unknown

Source : ICHEME

Location : , USA

Injured : 2 Dead : 0

Abstract

A pipe fitter and laboratory technician were testing pressures and temperatures on a gas recovery plant. They made use of one inch connections fitted with a valve and screwed plug. In one case the valve was open and on removing the plug there was large leak of light hydrocarbons. Fortunately it proved possible to close the valve and the hydrocarbon did not find a source of ignition. However two operators were affected by the vapours while closing the valve. [sampling, LPG, blowout, near miss, competency lacking, safety procedures inadequate, training inadequate]

Lessons

1. This was a one off rather than a routine job so supervision and instructions should have been more detailed.
 2. All personnel should be warned of the great care required in breaking joints on pressure equipment. Many accidents have been caused by wrongly assuming that it is already isolated.
 3. For this reason it is a wise precaution to have both operator and maintenance personnel to independently check the isolation.
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

During start-up a leak was noticed in the top head of a fluid catalytic cracking unit reactor, the unit was shutdown. On internal inspection, a 6 metre long crack was found following the toe of the weld which attached the plenum chamber to the head. Coke was deposited in the area and it was shown that the insulating effect caused a severe temperature gradient in the head.

The cracking was due to thermal expansion stress.

[hydrocarbons, coke, start-up, cracking , reactors and reaction equipment, catalytic cracker, plant shutdown, near miss, thermal expansion, crack, design inadequate]

Lessons

1. In designing high temperature equipment to minimise thermal expansion stresses and thermal shock, start-up, shutdown and other abnormal conditions must be allowed for. In the present case short shutdown s reversed the temperature differential and made it steeper, up to 80 degrees C over 20 cms.

2. To minimise the problem the thickness of the external insulation on the head was more than doubled. Alternatives would have been to use an external plenum or to steam purge the dead space to stop coke forming.

Source : ICHEME

Location : , NORTHERN IRELAND

Injured : 0 Dead : 0

Abstract

An operator opened a half an inch diameter welded bonnet gate vent valve on a pressure gauge tapping on this distillate hydrotreater to change the pressure gauge. Later, on shutting the vent valve the valve yoke broke away from the valve body. The valve was a half an inch diameter class 800 bonnet type wedge gate valve.

To open and shut the valve, the operator had used a 7 inch long wheel key. The wedge gate of the valve was left in the body seat and a temporary clamp was made to hold the wedge in the body of the valve. Fortunately throughout this operating sequence the main isolating valve was in the shut position, and this was maintained until the half inch valve could be renewed. The replacement was a half inch diameter wedge gate class 800 bolted bonnet valve. The valve sections were then submitted for metallurgical examination, which indicated that a hard metallurgical structure existed in the weld metal and adjacent heat affected metal zones. It was concluded that welding during manufacture of the valve had resulted in a hard metallurgical structure which was extremely sensitive to hydrogen cracking in welding and in service. As the valve was on a duty in a system containing hydrogen sulphide and hydrogen it is likely that the cracking initiated in service.

The refinery have decided to replace all such wedge gate valves of the welded bonnet type which are on hydrogen sulphide or hydrogen service with bolted bonnet type valves.

[maintenance, valve, gate valve, material of construction failure, valve failure, near miss]

Lessons

The use of wheel keys in opening and closing valves should be minimised. Excessive torque imposed in shutting valves particularly of the small type (such as in the incident) with a relatively large key may well lead to failure of valve components.

11659Date Unknown

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A stair panel gave way beneath an operator as he descended a LPG sphere stairway. Fortunately, he was able to grab hold of the handrail, and saved himself from a 25 feet fall. Investigation found severe corrosion at the point of attachment of the stairway to the sphere. This corrosion was not normally visible while using the stairway. Examination of stairways on other spheres revealed similar corrosion weaknesses.
[storage sphere, material of construction failure, near miss]

Lessons

Procedures and practices for the inspection of such structures should be revised to include specific guidance for identifying and rectifying corrosion on steel tanks and spheres

8857 Date Unknown

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG.

Location : , OFF ALASKA

Injured : 0 **Dead :** 0

Abstract

A marine transportation incident. A cruise ship had to make an emergency manoeuvre to avoid a tug and barge. The sudden turn caused a heel of about two degrees which caused the grand piano to slide across the ballroom floor and smash into a glass panel, the swimming pool to spill its contents over the lido deck and down stairwells and the products in the gift shop to fall off the selves. As the incident happened at night the passengers were all safely tucked up in bed.

[passenger ship, near miss]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1997, JUL.**Location :** ,**Injured :** 0 **Dead :** 0

Abstract

An inspector was nearly drowned when the raft he was using to inspect a cargo tank in an unmanned very large crude oil carrier capsized. He was part of a small team of inspectors carrying out an inspection of a centre cargo tank, which had been gas-freed and filled with clean ballast. The team requested additional ballast so that they could inspect the under-deck structure but, as the ballast was being taken on, turbulence capsized the raft and tipped one of the inspectors into the water. He fell almost 20 meters towards the bottom of the tank in an air pocket, was stunned by the fall and nearly drowned. He was able to climb to the surface and was rescued by the other team members.

After investigations into the incident it was found that air remaining in the bottom lines after tank purging escaped into the tank when ballasting from the sea was started. This caused the very turbulent conditions, bringing large air bubbles to the surface around and under the raft and causing it to lose buoyancy.

Lessons

The following recommendations were made:

1. Inspection teams are to stay out of cargo tanks while ballasting operations are being carried out.
 2. Life jackets or floatation vests to be used whenever working in ballasted tanks.
-

9660 Date Unknown

Source : LOSS PREVENTION IN THE PROCESS INDUSTRIES, F. LEES.

Location : ,

Injured : 0 Dead : 0

Abstract

A works had a special network of air lines installed some 30 years ago for use with breathing apparatus only. The supply to this network was taken off the top of the general purpose compressed air main as it entered the works. One day a man wearing a face mask inside a vessel got a face full of water. He was able to signal to the anti-gas man and was rescued. Investigations revealed that the compressed air main had been renewed and that the branch to the breathing apparatus network had been connected to the bottom of the compressed air main. As a result a slug of water in the main would all go into the catchpot and fill it more quickly than it could empty.

[protective safety equipment, operation inadequate, near miss]

Lessons

[None Reported]

9707 Date Unknown

Source : ICHEME

Location : , NEW ZEALAND

Injured : 0 Dead : 0

Abstract

A welding job had been done on a new 30 inch stainless steel pipe with an argon atmosphere inside the pipe to protect against weld porosity. After completion of the external butt weld, for no apparent reason boiler maker entered the pipe and succumbed due to the lack of a respirable atmosphere in the pipe.
[near miss]

Lessons

[None Reported]

11283Date Unknown

Source : INSTITUTE OF GAS ENGINEERS, COMMUNICATION 451, UNUSUAL INCIDENTS AT GAS WORKS AND THEIR LESSONS, PART 2, 28 SEP, 1954.

Location : ,

Injured : 1 Dead : 0

Abstract

An electric shock incident occurred on a gas works detarrer unit during recommissioning. The detarrer vessel was stripped down for cleaning and electrical maintenance was carried out con-currently. Prior to recommissioning the plant engineer wished to test the electrical installations. The area surrounding the tank was made clear and an operator posted to ensure no-one approached. A contract supervisor returned to the scene to confirm that cleaning activities inside the tank were completed and was not spotted by the operator who could not see all the vessel manholes from his vantage point. He also suffered from hearing loss and did not hear the contractor approach. The contractor looked inside the tank and suffered an electric shock to the head. The contractor was saved from a fatal discharge by his helmet.

[testing, near miss, maintenance inadequate, injury]

Lessons

The following recommendations were made:

1. The accident occurred despite the precautions taken to prevent it.
 2. Precautions require to be extremely thorough and well thought out.
 3. It is preferable to close or seal man-holes when control is required over openings.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

At the very beginning of the day shift, a hot work permit was issued to a contractor working on an above ground piping project. About an hour later, the dispatcher was informed by a transport driver that the Vapour Recovery Unit (VRU) was not working properly and vapours were evident throughout the area. The Dispatcher checked the VRU and found that it had shut down and that there were extensive vapours in the area. He immediately revoked the hot work permit from the contractor until the VRU could be repaired. While waiting for the VRU to be repaired, the dispatcher checked back with the contractor and found the contractor's crew performing welding and cutting operations near the VRU. When challenged the workers informed the dispatcher that the owner of the company had come to the site and fired the foreman, leaving no one in charge. The crew thought it was okay to proceed with their work. The dispatcher again shut down the project and contacted the terminal manager. The contractor owner was subsequently informed that his company was being removed from the project for serious safety violations.

The incident occurred in daylight, on a clear, chilly 45 degrees F (7 degrees C) day. The contractor's foreman, who was in charge of the project and who had received the communication about the hot work permit, was removed by the owner without notifying any other personnel, and the workers were left to continue on their own without any guidance.

The basic cause was a lack of clear communication between the company, the contractor and the contractor's crew.

This was a serious near miss in that non-permitted hot work was conducted in a hazardous area.

[gas / vapour release, management system inadequate]

Lessons

The following recommendations were made:

1. Communication among all individuals working in hazardous areas, both contract and company personnel, is vital and is everyone's responsibility. In this instance, the dispatcher's follow-up and his prompt action in revoking the hot work permit avoided a potentially very serious incident.
2. All contractor crews must be informed of the conditions under which work permits are issued and the importance of following correct procedures.

11840Date Unknown

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

On commissioning a unit to saturate 10% of diolefins in an aromatic feed stock a runaway reaction occurred with a peak temperature of 650 degrees C in the nickel catalyst bed. A large excess of hydrogen was used. At the feed temperature of 150% the initial reaction of the diolefins heated the bed to a point where the aromatics were hydrogenated to naphthenes. This raised the temperature above 260 degrees C at which point hydrocracking of any hydrocarbon to methane caused an exothermic reaction.

[nickel, reaction vessel, near miss, overheating, design inadequate, safety procedures inadequate]

Lessons

1. Small scale pilot plant reactor trails tend to operate closer to isothermal rather than adiabatic conditions. Thus the potential for runaway reactions may be missed.
 2. Nickel catalysts are extremely active for hydrogenation at low temperatures.
 3. In this case the problem was solved by:-
 - The reactor inlet temperature was lowered.
 - The excess hydrogen was reduced to about 75%.
 - Extra thermocouples were placed in the catalyst bed.
 - Means were installed to rapidly depressure the reactor.
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

Sulphur oxide and sulphuric acid corrosion holed the shell of a sulphur recovery plant furnace adjacent to a peephole. Faulty design of the refractory lining adjacent to the peephole and plugging of the low pressure air supply allowed to happen. The sulphur recovery plant was one of a pair so that each could be shutdown separately. However, the valving was inoperable at the time, as a result hydrogen sulphide flowed to atmosphere for three hours after the initial fire was extinguished. Fortunately no one was exposed to hydrogen sulphide poisoning.

[hydrogen sulphide, normal operations, furnace, gas / vapour release, near miss, corrosion, design or procedure error, inspection inadequate]

Lessons

1. Where air purges are essential to the safety of a plant there should be means of checking that a flow is present. In this case a higher pressure air supply was provided.
 2. Inspection of pressure vessels to be concentrated where failure is most likely. Any hole through the lining of vessel is such a point.
 3. Safety provisions which may only be required infrequently, such as the valve manifold for these two sulphur recovery plants, to be checked on a regular basis to see that they are in working order.
-

Source : LOSS PREVENTION BULLETIN, 024, PAGE 154.

Location : , USA

Injured : 0 Dead : 0

Abstract

A large spill of naphtha occurred from a leaking refinery tank but failed to ignite. The incident spread due to a failure of the tank dikes to contain the spillage. The earthen dike walls were pervious and allowed the naphtha to spread to adjacent tank dikes and hence into surrounding drainage ditches.
[tank failure, near miss, storage equipment]

Lessons

The incident highlighted the importance of good standards of design, construction and operation to ensure dike walls are effective.

1. Dike walls must be impervious, either by ensuring the walls contain a clay layer or are made of concrete.
 2. Dike drainage should be normally closed off and locked.
 3. Earth dikes must be protected against soil erosion.
 4. Dikes must be sealed where pipes pass through walls.
 5. Quality assurance testing of dikes if necessary during construction.
 6. A hydraulic test may be appropriate before going into service.
 7. Visual checks should be carried out at regular intervals to ensure standards are maintained.
-

9904 Date Unknown

Source : ICHEME

Location : , WEST INDIES

Injured : 0 Dead : 0

Abstract

A naphtha catalytic reformer had four radial flow reactors. The flow left the reactor by passing through screens into a slotted centre pipe. The centre pipe fitted into a socket in the bottom of the reactor and was held there by gravity.

After several shutdowns thermal expansion and friction with the catalyst worked centre pipe out of its socket. Some catalyst flowed to the next reactor and plugged the inlet screens there. The unit shut-down safely, however, such an incident could have caused a runaway reaction.

[continuous reaction, reactors and reaction equipment, near miss, design inadequate, thermal expansion]

Lessons

Any item of equipment in a catalyst bed where there are substantial variations in temperature should be firmly fixed in place.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

During the overhaul of a gear box the drive spindle had to be lifted out of the gearbox housing.

The foreman estimated the weight of the spindle to be approximately 5-7 tonnes and told the rigger to set up rigging facilities to handle it. Regarding the size and the weight of the spindle and to facilitate the set up, four additional holes were drilled through a big concrete floor above the gearbox.

At the start of the lifting operation, this was stopped and it was requested to provide additional rigging gear as the set-up was estimated too light. Awaiting this to be done, the supervisor left the area for an other job and was sometime later noticed that the drive spindle had dropped out of its chain blocks.

The rigging facilities were only slightly improved and just at the moment that the spindle was ready to be lowered to the floor, the chain of a three tonne block broke, this transferred the whole weight to the two tonne block of which the hook connection broke and the piece fell on the floor. Nobody was injured.

After the incident the spindle was weighed and found to be 8.6 tonnes.

[maintenance, mechanical handling equipment, plant / property / equipment, operation inadequate, near miss]

Lessons

[None Reported]

10063Date Unknown

Source : ICHEME

Location : ,

Injured : 1 Dead : 0

Abstract

Motor spirit was being discharged from a barge into a depot tank in the presence of a cloud of vapour some 1.5m high coming over the edge of the tank farm, which is some 9m above the depot yard and realised that the tank was overflowing. Without informing anyone he immediately ran through the vapour cloud and succeeded in switching the incoming product to another tank. While doing this he was nearly overcome by inhalation of vapour and lack of oxygen. [river barge, unloading, gas / vapour release, near miss]

Lessons

The first action to be taken in the event of an overfill is always to shut down the pump. Discharge should not be continued until the spillage has been cleaned up and the are made safe.

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A mobile crusher (driven by a diesel engine) was being used to reduce the size of broken concrete. It was being operated by two men standing on a platform near the input hopper. There was no protection to prevent the men from overbalancing into the hopper, and the (frequent) bridging which occurred was cleared by a man climbing into the feed hopper whilst the machine was still running.

No accident occurred, but the operation was investigated as a (potentially fatal) 'near miss'.

The machine apparently complied with the Health and Safety at Work Act, and the operators had been given a safety indoctrination talk on joining the site.

[demolition, milling, solids processing equipment, personal protective equipment, training inadequate, safety procedures inadequate, inadequate guarding, near miss]

Lessons

A number of changes to the method of working were stringently enforced:

1. The operators wore safety harnesses secured to the structure.
 2. The crusher must be stationary before anyone entered the hopper.
 3. Supervision was improved.
-

10119Date Unknown

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

During a shutdown on a hydrofluoric acid plant, a test blind was installed to allow for testing a replacement section of line. The line connected process vessels to a vent system, via an automatic valve. The plant was restarted without removing the blind: this meant that, in the case of a fire, it would not have been possible to relieve pressure to flare.

The error was noticed before any incident occurred.

[slip plate insertion/removal, maintenance, blind plate/slip plate, near miss, design or procedure error, vent system]

Lessons

Recommendations were made for improving procedures for inserting and removing 'test blinds'.

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

As a new boiler was being commissioned the safety valves were tested and adjusted by increasing boiler pressure until they lifted.

When one of the safety valves on the steam drum lifted on the first occasion an object was ejected from the top of the discharge pipe. This was later identified as the sealing ring from the bottom of the safety valve discharge pipe. It weighed 71bs and landed 150 feet from the boiler.

It was further established that the sealing ring from another safety valve discharge pipe was missing. An operator not involved in the testing observed a missile projected from this pipe towards a field across the (public) road from the plant.

Fortunately no injuries or significant damage resulted from the incidents.

The investigation noted that to reduce anticipated blow-off noise it was decided at a late stage in the design of the boiler to increase both the diameter and height of the safety valve discharge pipes. The increase in the height of the discharge pipes required independent supports with provision for movement due to thermal expansion. Normally this would be achieved by using a proprietary expansion chamber. However, the contractor (who was responsible for design, fabrication and commissioning) had extended discharge pipes fabricated, based on proprietary design, which incorporated a close fitting, but unconstrained, steel sealing ring. This design change was not reviewed.

The mechanism by which the ring was projected was believed to be either a vacuum effect or turbulence which lifted the ring into the steam jet.

[damage to equipment, maintenance procedure error, near miss, commissioning]

Lessons

It was recommended that a full retaining ring should be welded in at a suitable time. In the interim the installation was modified by welding four restraining pegs in each discharge pipe.

10581Date Unknown

Source : THE ROSPA BULLETIN, JUL 1987.

Location : , UK

Injured : 1 Dead : 0

Abstract

Steel-capped shoes saved a warehouseman from almost certain major disability when a forklift truck weighing one and a half tonnes rolled down a gangway and over his foot.

The vehicle came to a halt with his foot trapped beneath its drive wheel.

His safety boot took most of the impact of the weight and instead of receiving permanent injury he escaped with slight bruising.

[warehousing, near miss, injury]

Lessons

[None Reported]

10575Date Unknown

Source : THE ROSPA BULLETIN, JUL 1987.

Location : , UK

Injured : 1 Dead : 0

Abstract

An operator almost lost his life when he became trapped between a conveyor belt and a roller.

His life was saved by the quick thinking action of a workmate, when he saw what was happening he immediately hit an emergency safety button to cut the power.

For failing to fence dangerous machinery securely the factory owners were fined £1,200 (1987).

The operator who was injured had been bagging pulped materials when the incident occurred.

One of the sacks became stuck on the production line and when he could not knock it out of the way by hand he climbed onto the conveyor belt to free it.

However, he lost his balance and his foot went down into a gap between the belt and the roller. His leg had been drawn in as far as the knee when a nearby operator noticed and pressed the stop button. If he had not done so the consequences could have been fatal.

A fitter had to dismantle part of the equipment to release the operator.

[design or procedure error, operator error, near miss, injury]

Lessons

[None Reported]

10301Date Unknown

Source : HAZARDOUS MATERIALS INTELLIGENCE REPORT, 29 JANUARY, 1982.

Location : Mississippi River, USA

Injured : 0 Dead : 0

Abstract

A river transportation incident. Two barges ran aground. The two double skinned barges contained approximately 20,000 barrels of propylene oxide and polyethylene. A tug succeeded in freeing the barges after 12 hours. Fortunately there was no spillage reported.
[near miss]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 139, 18-19.

Location : ,

Injured : 0 Dead : 0

Abstract

During start-up operations of a polyethylene plant a leak was discovered on the main body joint of a cyclone. It was estimated that approximately three tonnes of hydrocarbon was released by this leak over a period of six hours. There was no injury to personnel or plant; no fire and/or explosion occurred, and all emergency procedures were correctly observed.

Following a number of unsuccessful start-ups during which excessive vibration had been experienced around the cyclone area, the design contractors advised that weights and slings should be added to the pipework to dampen the vibrations and overcome the problems.

However, within twenty-four hours of installing such modifications, the main joint on the cyclone started to leak resulting in a release of hydrocarbons. On discovery of the leak, the unit was safely shut down with no damage to personnel or equipment.

Investigation into the incident

The investigation highlighted that the hydrocarbon release had been caused by a joint failure of a temporary gasket. A gasket had been installed, in the absence of the standard gasket, and the modification had been made in accordance with site modification procedures. The investigation revealed that the gasket had failed as a result of a number of contributory factors, the most important being:

1. The flange surfaces had a finer surface than that recommended;
2. The presence of a sling produced an external load on the joint;
3. Inadequate torqueing of the flange bolts;
4. Poor quality of bolt cleanliness; and
5. The presence of high amplitude vibrations around the cyclone area.

[gas / vapour release, gasket failure, near miss]

Lessons

1. The need to ensure that plant modification procedures receive input by 'additional' specialist engineers when necessary to ensure the modifications safety.
2. The need to develop a training awareness programme highlighting potential problems resulting from excessive pipework/equipment vibration together with acceptable solutions.
3. The need to develop and implement training awareness courses on the correct torqueing and tensioning techniques, including the importance of clean, well lubricated bolts, and the significance of flange surface finish for different gasket materials.
4. The need to avoid reliance on a 'single source' to supply critical flange gaskets.
5. The need to eliminate potential vibration problems at source, and not to resort to temporary short term 'fix-it' solutions without thorough investigation as to the potential cause of the vibration.
6. Following a fundamental review of the process design and installation, significant modifications were made in the construction of the supporting structure and pipework which eliminated the vibration.

Source : FIRE PREVENTION, JAN, FEB 1987.**Location** : , USA**Injured** : 0 **Dead** : 0

Abstract

An accidental discharge of Halon 1301 (CF₃Br) extinguisher system occurred in a communications centre. It is believed that the detectors were set off by a high-power hand-held radio transmitter which was in use at the time. The system was designed to produce a concentration of 5% (volume) Halon 1301 within 10 seconds.

Eleven people were working in the room, which had a volume of about 9 cubic metres. The normal ventilation rate was 0.4 cubic metres/second, but this system shut down automatically when the Halon system activated. The release of the Halon caused a very loud noise and a dense fog, which made it difficult for people to evacuate the building. People exposed to the discharge experienced temporary light-headedness, headache, nasal complaints and disorientation. However there were no long term effects. This is in line with expectations from experiments on the toxicity of Halon 1301.

[office work, fire protection equipment, near miss, radio frequency interference]

Lessons

Recommendations were made to reduce the potential hazard of accidental discharge of Halon systems:

- training personnel what to expect and how to act
 - ensuring that proper action is taken in the event of a false alarm
 - screening detectors from radio frequency radiation
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

Sulphur oxide and sulphur acid corrosion holed the shell of a sulphur recovery plant furnace adjacent to a peephole. Faulty design of the refractory lining adjacent to the peephole and plunging of the low pressure air purge supply allowed this to happen. The sulphur recovery plant was one of a pair so that each should be shutdown separately.

However, the valving was inoperable at the time, as a result hydrogen sulphide flowed to atmosphere for three hours after the initial fire was extinguished.

Fortunately no one was exposed to hydrogen sulphide poisoning.

[design inadequate, gas / vapour release, near miss, inspection inadequate]

Lessons

1. Where air purging are essential to the safety of a plant there should be means of checking that a flow is present. In this case a higher pressure air supply was provided.

2. Inspection of pressure vessels should be concentrated where failure is most likely. Any hole through the lining of a vessel is such a point.

3. Safety provisions which may only be required infrequently, such as the valve manifolding for these two sulphur recovery plants, should be checked on a regular basis to see that they are in working order.

Source : LOSS PREVENTIONBULLETIN, 035, 4-5.

Location : ,

Injured : 0 Dead : 0

Abstract

Originally, the inner cone of a cyclone dust separator was clamped with its own flange between the upper flanges of the cyclone. Since the cyclone was earthed, the inner cone was also earthed. A check revealed that the flanges of the cyclone had to be reinforced to withstand a possible internal dust explosion. When the modified cyclone was reassembled, the inner cone was no longer electrically bonded to it, being isolated by a non-conductive gasket. Shortly after start-up sparking was observed on the outside of the cyclone between the flange of the inner cone and the flanges of the cyclone due to electrostatic charge generated by the dust.

[lack of earthing, modification procedures inadequate]

Lessons

This is an example of a near miss which illustrates the hazard of a non-earthed conductive element of a comparatively high capacity in an environment where static electricity can be generated. It also emphasises the dangers of hazards which can be introduced into a plant when a plant modifications are made without proper hazard analysis, even when such modifications are intended to improve the safety of the plant.

7797 Date Unknown

Source : BARTON J AND ROGERS R, CHEMICAL REACTION HAZARDS, 2ND EDITION, ICHEME, 1997, APPENDIX 1, 184.

Location : ,

Injured : 0 Dead : 0

Abstract

A suspension polymerisation was being performed in a Pfaudler kettle. Failure of the circulating water to control the exothermic reaction caused the pressure and temperature to rise far above normal. The cooling water flow was manually controlled. Water from the fire hose was played on the outside of the kettle to bring the reaction under control. Near miss.

[high pressure, high temperature]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 083, 25-26.

Location : ,

Injured : 0 Dead : 0

Abstract

The failure of a gauge glass on a filter resulted in a high pressure release of relatively pure hydrogen and entrained lube oil. The vessel operated at 103-107 bar g at 149 degrees C maximum. Rapid response by operators had upstream compressors shutdown and isolated. Probable failure of the glass was thought to be a burr on the surface of the gauge glass gasket, creating stress resulting in the brittle fracture failure of the glass. The manufacturer received the failed gauge glass, installed the new glass and pressure tested the glass at 345 bar for twenty-four hours without failure. The burrs were left on the gasket surface. It was suggested that the failure was caused by a damaged glass. Near miss.

[gauge glass failure, reaction vessel]

Lessons

The following recommendations were made:

To identify and retrofit all vessels with gauge glasses operating above 34.5 bar in non-fouling service with excess flow valves. The necessity of hydro-testing gauge glasses prior to installation be made.

It should be taken into account that not only the pressure but equally the volume of the product itself and the location of the drum equipped with level glasses should be considered when retrofitting excess flow check valves. Also the gauge glasses with magnetic followers for example are an appropriate loss prevention measure.

Source : LOSS PREVENTION BULLETIN, 068, 35-36.

Location : ,

Injured : 0 Dead : 0

Abstract

This incident occurred on an indoor plant built for the continuous polymerisation of chemicals. For a long period there had been no significant problems until a near miss occurred. On this occasion the bearings failed on a centrifugal pump handling mixed monomers, leading to considerable overheating, much smoke generation, etc. No fire occurred because no flammable liquors were in contact with the hot surfaces. The most alarming feature was perhaps that an operator had detected the problem during other duties and that the temperature monitoring systems had not reacted correctly.

After investigation it was found that:

1. The temperature monitor on the pump had apparently first failed 23 hours before the incident, indicating minus 47 degrees C. It had then indicated a normal 22 degrees C for some hours but did not show any temperature rise until after the pump was shut-down when 90 degrees C was indicated. None of this was observed until the enquiry was started.
2. It was thought that continuous mild vibration had caused this temperature probe to become slightly displaced. It was clear that other causes of failure were possible at the plant end including poor connections and broken wiring. Detailed attention was given to the type of sensor used at the various points and their mechanical attachment to the pumps and motors. In addition wiring standards were reviewed and it was seen that a 2 wire system had better fail safe properties for slight loss of temperature indication accuracy than the installed 3 wire system.
3. The plant was seen to be exceptionally vulnerable to escalating damage with very high consequential losses. There was considerable discussion about the strategic aspects of preventing losses in it. There was a view that temperature monitoring was necessary because:
 1. The probability was low that hot spots would coincide with flammable escapes (1 x 10 per year estimated by one investigator).
 2. It was not likely that the metals would reach around 400 degrees C before the pumps tripped on mechanical overload.
 3. The premises were sprinklered to a high standard.
 4. Gas detectors were placed adjacent to likely sites of flammable emissions.
 5. Maintenance policies meant that hot spots would be rare and that flammable emissions were also, estimated as one in five years.
 6. It would be a better investment to resite the more dangerous pumps outside, or certainly from under the stocks of flammable liquors.

[bearing failure, instrumentation failure, operator error]

Lessons

1. Hardware is useless in itself unless supported by personnel able to see and hear what it is doing for them (chart readability, alarm indicators).
2. Means of verifying, at appropriate intervals of time, that the critical instruments and valves are working correctly, must be designed into the equipment and into the operating organisation (simulation of activation techniques, memory systems, records).
3. Elaborate hardware often leads to over confidence in it, and plant tours and log sheet patrols continue to be necessary.
4. Avoidance is better than prevention. A plant designed to good standards will often not require elaborate safety devices.

Source : LOSS PREVENTION BULLETIN, 083, 9-10.

Location : ,

Injured : 0 Dead : 0

Abstract

A 1.2 m non-return valve fitted with a hydraulic oil brake system failed to close during a trip of a steam turbine driven axial compressor, which supplies product gas to a common header. The common header is supplied by a number of identical compressors, each delivering product gas at a pressure drop of 600 kPa. The available pressure drop on the compressor, the trip condition of the turbine and the faulty non-return valve resulted in a reverse rotation of the turbine and compressor. A reverse speed equal to the normal rotating speed of the machine was registered.

Plant operating personnel became aware of the reverse rotation of the turbine and compressor and manually closed the discharge valve on the compressor, before any damage occurred.

A detailed investigation on the failed 1.2 m non-return valve revealed, a damaged internal flapper stop ring, a bent external piston connecting rod and a low oil level in the piston chamber.

The low oil level in the piston chamber reduced the efficiency of the shock absorber which may have contributed to the damage to the internal flapper stop ring.

Complete closure of the non-return valve was restricted by the bent connecting rod which jammed in the shaft sealing section of the hydraulic oil brake system.

[valve failure, near miss]

Lessons

Corrective measures taken to prevent a recurrence of the failure are the following:

1. The fitting of a transparent oil reservoir on the oil chamber of the oil brake system to facilitate the regular checking of the oil levels.
 2. Inclusion of the oil braking system and associated connecting parts of the non-return valve in the scheduled maintenance inspection programme.
 3. Re-emphasising the inclusion of non-return valve inspections and maintenance in scheduled maintenance and inspection programmes.
-

Source : LOSS PREVENTION BULLETIN, 088, 23.

Location : ,

Injured : 0 Dead : 0

Abstract

Static electrical discharges were seen when an organic powder was tipped into a vessel from plastic bags. No fire occurred as the vessel contained non-flammable material but flammable solvents were handled nearby.

Measurement of static showed voltages of up to 12 kV.

[charging reactor, near miss, screw conveyor, shoes]

Lessons

The following should be considered:

Avoid flammable atmospheres:

1. Ensure the temperature of the flammable liquid is below the flash point. A margin of 15 degrees C below the flash point is usually required to obtain a sufficiently lean mixture.

2. Use an inert gas blanket in the top of the vessel.

3. Charge through a rotary lock screw conveyor or similar. The atmosphere in the vessel outside the flammable region by being too rich, inert blanketed, or too lean by using ventilation.

Avoid static electricity as a source of ignition:

A charge transfer in excess of 75×10^{-9} Coulombs should be considered hazardous.

1. Use a damp powder and add via an earthed tundish or better still, an earthed screw feed.

2. The operator should wear anti-static shoes and gloves when handling powders to avoid being a collector of any static electricity. The powder should also be purchased in conducting bags to avoid the bags being a collector of static electricity.

3. All metal equipment should be earthed.

7499 Date Unknown

Source : LOSS PREVENTION BULLETIN, 119, 13-14.

Location : ,

Injured : 0 Dead : 0

Abstract

The incident happened when a container was brought into a control cell for monitoring when the inner and outer protective doors, which should have been interlocked so that only one could be opened in such situations, were both standing open. No one was hurt. Prompt action by a plant operator averted the danger, which could have had serious effects on anyone close to the doors with the container present in the cell.

After investigation it was established that modifications subsequently carried out in the interests of safety, had the effect of weakening the effectiveness of the mechanisms controlling and interlocking doors.

[radioactive, near miss, safety procedures inadequate]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 097, 9.

Location : ,

Injured : 0 Dead : 0

Abstract

During start-up of a new process, leaks occurred at two valve flanges due to the use of titanium gaskets. Titanium reacts vigorously with dry chlorine. These gaskets were improperly identified by a supplier and sent in error.

Due to prompt shutdown action by the plant operators, the release was minor and there were no injuries.

Five gaskets were removed from the chlorine line and sent to the corrosion laboratory for analysis. It was determined that three out of the five gaskets were made of titanium. Titanium ignites in the presence of liquid chlorine.

[testing inadequate, identification inadequate, incorrect material of construction, near miss, gas / vapour release]

Lessons

The following recommendations were made:

All the gaskets in the chlorine line were removed. All gaskets to be used in future chlorine service at the semi-works should be tested for positive identification of their materials of construction. This should be evolved into a system to test all materials, i.e. valves, lines, etc., that will be used in chlorine service for positive identification of their materials of construction.

Source : LOSS PREVENTION BULLETIN, 092, 10.

Location : ,

Injured : 0 Dead : 0

Abstract

A maintenance planner requested a contractor to arrange for a repair to be carried out to the drain leg branch on a filtration system. The task was given to the contractor's tradesman who was shown the pipe to be repaired by the planner, who stressed that the job was to be finished quickly.

Later that day, a plant operator found the tradesman working on the spigot without having reported to the plant control room for a Permit to Work. He reported the incident to the plant supervisor, who in turn informed the planner and plant manager.

Maintenance had been carried out on the filter the day before, and the equipment had been isolated for this work. The drain branch was open as the valve had been removed. The contractor had assumed that the filter was still isolated when working on the spigot the next day. On inspection of the pipework by the supervisor, it was found that the contractor had sawn off the drain branch completely.

Although the tradesman was a very experienced foreman of the contractors, he admitted that he had been in error in not obtaining a Permit to Work. He believed the filter was safe to work on because the valve had already been removed from the drain branch.

Near miss.

[contractor error]

Lessons

Actions to be taken to prevent a recurrence:

1. Contractors to inform the company in writing of the actions they are taking to prevent a recurrence regarding the individual concerned together with all their site employees.
 2. Contractor to receive safety induction training session.
 3. The quality of the induction training package is to be reviewed.
-

Source : LOSS PREVENTION BULLETIN, 127, 10-11.

Location :

Injured : 0 Dead : 0

Abstract

A large distillation column was made of two halves. A 42 inch (1.07 m) vapour line, containing a bellows, which ran from the top of one half to the bottom of the other.

During a shut-down this line was steamed out. Immediately afterwards it was noticed that one end of the bellows was 17.7 cm higher than the other although it was designed for a maximum deflection of +/- 7.6 cm. Near miss.

Lessons

The following recommendations were made:

1. All modes of plant operation, including transient conditions occurring during start-up and shut-down, should be identified and any bellows in the system designed for all conditions.
 2. All bellows and their supports should be checked in detail at acceptance and commissioning.
 3. Bellows have only limited tolerance for errors in design and installation and wherever possible their use should be avoided on new plants by building flexibility into the piping.
-

Source : LOSS PREVENTION BULLETIN, 130, 18-19.

Location : ,

Injured : 0 Dead : 0

Abstract

A thin film evaporator was being used to recover solvents from a slurry of variable composition. The operation was not central to the manufacturing operation, and the materials concerned were known to be chemically inert. For these reasons, only a cursory safety study had been carried out prior to commissioning. The plant was fed with a slurry from the waste streams of another plant. The feed consisted of a polymer solid dispersed in a hydrocarbon solvent. The plant was designed to recover the solvent by evaporation from a thin film under vacuum, contributing to reduction in costs of both raw materials and waste disposal.

It was operated by a team whose primary interest was the plant producing the feed. The composition of the feed varied at around 10 - 20% solids, and the flow through the drier was adjusted manually to allow for this variation. The dried powder waste was dropped periodically from the bottom of the drier into a bottoms vessel, where the vacuum was let up with nitrogen. This arrangement allowed the drying process to continue whilst each slug of solid was dropped into a drum under the drier. The sequence controller dropped solids out through the bottom of the drier every five minutes. Blockages in the flow of dried powder waste were not uncommon, because of the control difficulties caused by the changes in the composition of the feed.

On the night of the incident, a blockage occurred at the base of the drier or in the bottoms vessel. The shift team decided that the bottom section of the plant had to be removed in order to allow the blockage to be cleared. The fitter was notified and the plant left idle. The fitter was delayed for about 5 hours. The work permit to allow the work to proceed was issued and the drier was split at the bottom slide valve. Whilst the blockage was being cleared, a quantity of charred material was seen to fall from the bottom of the drier, and the company fire and emergency crew summoned. No flames were observed. An inquiry found that the steam supply to the drier had been left switched on during the time the fitter was delayed. Some sections of the drier that were not swept by the drier blade were heated by steam. The dry material, normally inert polymer, was being heated for the extended period. It was also found that the slide valves fitted to the bottom of the drier bottoms vessel were probably leaking slightly, and that air was being drawn through the solids during this time. A laboratory investigation showed that the solids were stable up to very high temperatures in anaerobic conditions. In a stream of fresh air the solids were susceptible to oxidate degradation. Near miss.

[flow restriction]

Lessons

The following recommendations were made:

1. The composition of the feed stream was to be checked prior to each run, and adjusted by addition of solids or solvent to some consistent value to allow easier control. It was also considered that addition of an inert powder such, as talc, might assist flow of the solids at the bottom of the drier.
2. Operating instructions and training were to refer to the need to cut steam supplies to the plant whilst it was awaiting attention from the fitters.
3. Steam heating on un-swept sections of drier was to be removed.
4. The inquiry also identified potential problems which could arise due to evaporation of a flammable liquid, albeit in a correctly zoned plant area.

Source : LOSS PREVENTION BULLETIN, 130, 19-20.

Location : ,

Injured : 0 Dead : 0

Abstract

Glowing embers in fluidised bed drying operations.

The drying operation occurred in two stages. In the first the moist product was broken down into lumps of around 1 cm diameter, and dried in a continuous process in a fluidised bed drier. To assist the flow of the chips along the bed, a number of additives (totalling much less than 1% of the output from the dryer) in a solution were mixed with the chips before they went into the drier. In the hazards assessment for the process, no adverse interactions between any ingredient in the solution or between the product and any ingredient were found.

The dried chips were further processed before being sprayed with another set of additives (also amounting to much less than 1% of the product) and then dried again, this time with a smaller chip size than previously. Again, no adverse chemical interactions were found prior to commissioning.

The first incident occurred when the filter elements in a polishing filter on the output side of the primary dust collectors were changed. Surprisingly, the embers were not seen whilst the filter elements were being changed, but over eight hours later when the discarded cartridges were found to be smouldering in the skip outside the factory building.

The second incident occurred whilst drying fine material recovered from the primary dust filters. This resulted in a lower grade of product, which was still saleable and reduced waste. Due to an oversight, the temperature of the fluidised bed was not reduced for the different feed, and glowing embers were observed by operators halfway down the bed a short time after processing began.

The third lot of charred powders were found by a commissioning engineer whilst a new drier was being brought on-line. The first runs were conducted with (expendable) recovered fines. A blockage occurred in a hopper underneath a dust filter, and some (cold) charred material was found in the blockage.

[heating, near miss, testing]

Lessons

Standard battery tests did not spot the problem, because all materials tested were plant samples, and the principal components of the problem reaction were massively diluted and apparently separated in the process. A new testing regime was needed which tested not only the mixtures expected to arise on plant, but also all those which could arise, even if they contain materials which are intended to form only a tiny fraction of the product.

Even tiny changes in formulation can give rise to wholesale changes in the properties of the product. The effects of formulation changes on the hazardous properties of materials were checked to ensure that the basis of safety for the process remained valid.

7647 Date Unknown

Source : LOSS PREVENTION BULLETIN, 134, 22.

Location :

Injured : 0 Dead : 0

Abstract

A near miss incident. The entrance to a steam turbine was made up of 8 entry paths, one from each poppet valve of the regulator. The final section as it entered the turbine body was rectangular with internal cylindrical bracing rods. After a number of years the cylinder to plate weld cracked, and was replaced by a flat plate with rounded profiles at the front and rear. The dimensions were identical, with only the void between the rods having been filled in. The gas flow swirled round a bend, such that the angle of incidence on the bracing plate would be finite. At one particular valve position the whole turbine resonated. The frequency was proportional to the square root of the steam absolute temperatures, therefore it was clearly acoustic. When the rods of a slightly larger size were fitted the vibration disappeared.

[excessive vibration, near miss]

Lessons

[None Reported]

Source : PREPARATION FOR MAINTENANCE, ICHEME, TRAINING PACKAGE, 004, 14-15.

Location : ,

Injured : 0 Dead : 0

Abstract

A fitter was given a Permit to Work to clear a choke in a caustic soda line leading to a storage tank. The instructions were to locate and clear a choke in the caustic soda line. Valve in caustic line to be closed and locked shut.

The fitter was familiar with the plant, having worked there for some time, nevertheless he broke the joint down.

When the line from the plant to the tank was blown with nitrogen, to prove that it was clear before moving some product through it, which was the usual procedure, a fine spray of corrosive liquid came out of the broken joint onto the surrounding area. Fortunately no-one was injured.

[maintenance procedure error, spill]

Lessons

The following recommendations were made:

This accident could have been prevented by a better system of working. Equipment which is given to maintenance staff should be identified by labelling, the number of the label then being added to the Permit to Work. In this case a label should have been fixed to the two joints which defined the section of line which could be dismantled or to all joints on this line. Identification of equipment by describing it or by pointing it out is not sufficient.

Source : FURNACE FIRES AND EXPLOSIONS, ICHEME, TRAINING PACKAGE, 005, 9.

Location : ,

Injured : 0 **Dead :** 0

Abstract

Before lighting a furnace the atmosphere inside was tested with a combustible gas detector. The instrument indicated that gas was present.

This was no way connected with the furnace. It came from the base of the cooling tower nearby which cools the water from direct contact jet condensers on three vacuum stills. The fan on the cooling tower had been switched off to save electricity as it was not necessary for cooling. When it was switched on, the vapours dispersed.

Near miss.

[testing]

Lessons

The following recommendations were made:

1. Changes made for good reasons may introduce new hazards could arise.
 2. Keep the fan running.
 3. Install an alarm which will sound on fan failure or fit a combustible gas detector between the tower and the furnace.
 4. On a new plant, area classification should draw attention to the hazard. The area round the cooling tower should be e.g. Division 2 and the furnace should be placed outside the Division 2 area.
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

In a catalytic reformer annular reactor the deflector plate over the top of the catalyst bed failed. The reactor inlet flow then impinged on the top of the bed displacing some catalytic behind the annular screen. This created an area of low LHSV in the catalyst bed where highly exothermic hydrocracking reactions could take hold. Luckily this was detected by multiple skin thermocouples on the vessel shell before it ruptured. The unit was shutdown.
[naphtha, hydrogen, continuous reaction, reaction vessel, near miss, flow rate too low, runaway reaction, design inadequate]

Lessons

1. In a location with low LHSV there is time for the hydrocracker reactions to develop and insufficient flow to carry away the heavy produced. This results in a spiralling increase in temperature.
 2. To counter this problem:-
 - Reactor internals must be firmly secured. In another case the annular screen came loose again allowing catalytic to get behind it.
 - As the area of low LHSV is usually small multiple thermocouples are required to detect it. The reactor outlet temperatures may only rise slightly.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

During start-up of a unit the cooling water systems to all condensers were observed to be full of a residue/propane mix and relief valves started lifting. The furnace was shut down and all coolers and condensers isolated. The charge coolers were found to be leaking in both passes and during the pressure test on the east side, the cooling water drain blew off, releasing propane to grade. Water spray was applied to disperse the vapour leak until depressuring was completed, then steam lances were positioned to disperse any residual vapour.

[gas / vapour release, near miss]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A lifting rope supporting a butane loading hose from a fixed crane at a river jetty failed without warning, allowing the hose and attachments to fall about 20 feet onto the jetty head, narrowly missing an operator.

The rope was used to raise and lower the hose on a single masted two jibbed fixed crane located at the jetty head specifically for handling hoses. A ship tied up at the jetty had just finished loading another hydrocarbon product (using another hose/crane combination) and the jetty operator was disconnecting the water supply hose which was suspended from the other jib of the single mast crane. The two crane jibs and hoses are totally independent of each other and there was no connection between the hoses.

Initial inspection of the rope revealed that extensive corrosion had occurred in the area of the failure which was at the block sheave. Approximately 60% of the 95 individual wires making up the rope had corroded through and the remaining wires had failed in tension. It was concluded that the corrosion resulted from a general lack of lubrication on the section of rope between the winding drum and the attachment to the hose fitting under the jib.

The section of rope within the winding drum was, however, well lubricated. The failure point was found to be in the region where, in the normal at rest position, the rope would have been around the trolley or block sheave. When a wire rope is left around a sheave the strands tend to open out allowing ingress of moisture. In the marine environment of the jetty, and with the lack of lubrication, corrosion rapidly occurred.

[near miss]

Lessons

The enquiry into this incident recommended that the entire rope be lubricated on a routine basis, the periods between thorough crane and rope inspections, currently 12 months, be reviewed and that full scaffolded access to the crane jib be provided at every thorough inspection. A review of material and construction of the ropes was also recommended to identify the availability of more corrosion resistant ropes for this particular duty.

11913Date Unknown

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A hydrotreater unit was shutdown to regenerate the catalyst by burning off coke deposits. The reactor was first to be evacuated and purged with nitrogen to remove combustible vapours. However, despite checks to ensure against air in leakage, the temperature at the top of the catalyst bed rose from 320 degrees C to 780 degrees C in the course of four nitrogen purges. Only then was the quality of the nitrogen supplied by a contractor, checked and found to be mainly compressed air.

[nitrogen, air, purging, catalyst, reaction vessel, near miss, oxygen enrichment, inspection inadequate, faulty instructions]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

During commissioning of a catalytic cracking unit, it had to be shutdown and steamed out for minor modifications. On restarting the diaphragm loaded pilot operated relief valves on the wet gas compressor suction leaked. It was found that the steam out temperature had damaged the rubber diaphragms and o-rings on these valves. Fortunately the leak did not ignite.

[steam, safety relief valve, gas / vapour release, near miss, thermal degradation, design inadequate, incorrect material of construction]

Lessons

1. During commissioning a close watch should be kept on new plant to detect faults before damage occurs.
 2. When setting equipment design specifications allowance must be made for abnormal conditions such as those during star-ups and shutdowns.
-

11908Date Unknown

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

Ammonia was delivered to a refinery in a 1 tonne trailer. To offload it a swing line was hooked up to the top connection. However when the trailer 20mm valve was opened the bushing below it broke away and the ammonia was released. The trailer was fitted with a manual excess flow check valve but no one on site knew that or had been trained how to actuate it.

[ammonia, unloading, road tanker, near miss, gas / vapour release, joint failure, design inadequate, safety procedures inadequate]

Lessons

1. Suppliers equipment needs to be checked and approved before its use is allowed within a plant. This trailer did not meet compressed gas industry standards and the use of it and others like it was banned.
 2. Operators must be trained in the details of suppliers equipment.
 4. Failures of small screwed connections are not infrequent and socket welding is preferable.
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

In a light hydrocarbon vapour recovery unit after 20 years satisfactory operation, severe hydrogen blistering appeared in the top of the adsorber column. Ruptured blisters to a depth of one third of the vessel wall thickness were present. It was found that the water wash on the feed to the adsorber had been discontinued 6 months before due to a faulty rotameter. This water wash was there to remove cyanides and sulphides from the feed to the adsorber. These were the cause of the blistering.

[hydrogen cyanide, sulphides, separation, modification, absorption, damage to equipment, near miss, modification procedures inadequate, hydrogen blistering]

Lessons

1. Modification to operating procedures should not be implemented before an analysis of potential hazards has been made.
 2. Hydrogen probes were installed in the vessel and the water wash flow was controlled so that rise in the probe pressures was minimal. There was then no further hydrogen blistering.
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

Severe vibration on some large new large reciprocating compressors caused several fatigue failures in small bore piping connected to the compressor manifold. Then a weld cracked on a nozzle of a suction pulsation damper. The cause was a standing wave in the damper which had to be redesigned to eliminate it. In the meantime restriction orifices were fitted to reduce the problem.

[hydrocarbon gas, compressor, nozzle, rupture, near miss, excessive vibration, design inadequate, inspection inadequate]

Lessons

1. Small bore piping connected to rotating or reciprocating equipment should be inspected for excessive vibration and additional supports provided if necessary.
 2. Potential vendors of pulsation dampers should be checked to see if they have previously supplied satisfactory dampers for equivalent services.
 3. The correction of known vibration problems should not be left until a serious failure occurs.
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A catalytic cracking unit centrifugal compressor had suffered from infrequent surging. After the last overhaul it had been returned to service with a 20 litre per day internal oil leak. Consequent fouling was thought to have destroyed the balancing drum labyrinth and this caused the thrust bearing to fail. Low oil pressure failed to shut down the electrical motor drive because of a corroded lead from the switch leak battery. For the same reason the manual stop button was ineffective. A delay in closing the isolator switch resulted in the compressor internals being mostly destroyed.

[hydrocarbon gas, repair, compressor, damage to equipment, near miss, safety equipment failure, maintenance inadequate]

Lessons

1. Returning equipment to service in less than satisfactory condition can be more expensive than the extra time required to complete the repairs.
 2. Safety shutdowns can give a false sense of security unless they are checked on a regular basis to ensure they remain serviceable.
 3. Large centrifugal compressors should have effective surge prevention instrumentation.
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

On the cryogenic section of an ethylene unit carbon steel piping in a flare line split on four occasions in seven years due to brittle fracture at low temperatures. The cracks were small and were clamped to seal them off. There was a manually controlled heater upstream of this carbon steel piping which was intended to prevent cold product reaching it. On the fifth occasion the pipe split completely, fortunately there was no fire. The heater was found to be turned right down.

[methane, venting, start-up, pipe, rupture, near miss, brittle fracture, design inadequate, low temperature]

Lessons

1. When a failure occurs more than once it is time to treat the disease and not just the symptoms as had been done in this case.
 2. For the highly variable and intermittent flows in a flare line a manually controlled heater is most unlikely to produce a consistent outlet temperature. It is a fig leaf.
 3. The piping down stream of the heater was changed to the same cold resistant stainless steel as was used upstream.
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Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

In a propane dewaxing plant, over time, piping and equipment becomes coated with wax and naphtha is used intermittently to flush this out. In this case a temporary naphtha connection to a line between the low and high pressure cylinders of the propane compressor had been left in place. The valve either leaked or vibrated open and let liquid into the high pressure cylinder which then ruptured. It was only due to extreme good fortune that no fire resulted. [propane, cleaning, compressor, rupture, near miss, slug, safety procedures inadequate]

Lessons

1. Everyone should be made aware of the disastrous consequences which can result from a slug of liquid entering a compressor.
 2. If temporary connections for use during a shutdown are to be left in place they should be subject to a safety assessment of the type used in HAZOPS.
 3. The connection should either have been removed before start up of the unit or at least fitted with double block and bleed valves.
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Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

Two machinists were carrying out an overspeed test on a steam turbine. The spacer type coupling had been unbolted at the pump end and pulled back away from the pump. While running at below trip speed vibration caused the coupling to move back towards the pump and re-engage. The shaft bent and the coupling was thrown free. Fortunately no one was injured.

[steam, start-up, testing, turbine, damage to equipment, near miss, maintenance procedure error]

Lessons

1. The spacer coupling should have been:

- a) Removed or
 - b) clamped against movement or
 - c) disconnected at the turbine end
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A boiler fuel oil feed pump lost suction, probably due to light ends in the fuel. When the turbine driver sped up neither the governor nor the overspeed trip cut off the steam supply. The governor tore loose but the operator closed the manual steam valve before further damage was done. The overspeed trip was found to be stuck open and the governor valve stem badly fouled, probably by solids from the superheater spray water.

[fuel oil, steam, normal operations, turbine, protective safety equipment, near miss, damage to equipment, inspection inadequate, safety procedures inadequate]

Lessons

1. Though the incident was triggered by changing the fuel oil supply tank this was not the cause of the problem.
 2. Safety devices such as overspeed trips must be checked on a routine basis. This can easily be done when shutting the unit down for maintenance.
-

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

The level transmitter on a high pressure high temperature separator of a gas oil hydrotreater froze due to failure of the heat tracing on the level bridge. The operator did not realise this and ignored the independent high level alarm in the separator. When his mistake became obvious the level control valve was put on manual and opened further. His action was too abrupt so the down stream separator overflowed, its condenser was overloaded and hot sour gas/liquid flowed to an amine scrubber unit. The sour gas pipeline expanded forcing a draw nipple against a pipe support and shearing it off. Due to confusion over the identity of the line concerned, between two operators, it was some time before the leak was stopped. Fortunately it did not ignite.

[gas oil, normal operations, heat tracing, level meter/control, rupture, product loss, near miss, operator error, freezing, design inadequate]

Lessons

1. Heat tracing and other safety related items need to be checked on a routine basis to ensure they remain in working order.
 2. Operators need to be trained to detect frozen control valves and transmitters. Almost always one chart recorder trace will start drawing a straight line rather than the drift of an indicated variable or the minor wobbles of a controlled variable.
 3. Alarms which affect the safety of the plant should never be ignored until it has been proved that they are faulty. In the present case the lack of any movement in the controlled level should have suggested that the fault was there.
 4. Small bore connections to long lines must be located well away from pipe support.
 5. All personnel should be trained to identify equipment unambiguously when talking to others. In the present case the term "vent gas line" was used which could have referred to several pipes in the area.
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Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

Sulphur oxide and sulphuric acid corrosion holed the shell of a sulphur recovery plant furnace adjacent to a peephole. Faulty design of the refractory lining adjacent to the peephole and plugging of the low pressure air plunge supply allowed this to happen. The sulphur recovery plant was one of a pair so that each could be shutdown separately: However, the valving was inoperable at the time, as a result hydrogen sulphide flowed to atmosphere for three hours after the initial fire was extinguished. Fortunately no one was exposed to hydrogen sulphuric poisoning.

[hydrogen sulphide, continuous reaction, furnace, gas / vapour release, near miss, corrosion, design inadequate, inspection inadequate, safety procedures inadequate]

Lessons

1. Where air purges are essential to the safety of a plant there should be means of checking that a flow is present. In this case a higher pressure air supply was provided.
 2. Inspection of pressure vessels should be concentrated where failure is most likely. Any hole through the lining of a vessel is such a point.
 3. Safety provisions which may only be required infrequently, such as the valve mainfolding for these two sulphur recovery plants, should be checked on a regular basis to see that they are in working order.
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