

Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, OCTOBER 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 : Mumbai, INDIA

Injured : 6 **Dead :** 0

Abstract

A fire occurred at a chemicals company. The fire occurred near a petroleum storage tank at the facility. Fortunately the tank was not involved in the incident. Approximately one hundred fire fighters took nearly to hours to control the blaze. Six fire fighters were injured in the incident. The cause of the fire is not known.

[fire - consequence, storage tanks, injury, unidentified cause]

Lessons

[None Reported]

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

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Location : Phoenix, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at an explosives test facility. The fire occurred when approximately 50 pounds of unknown chemicals were being mixed. Buildings in the surrounding area were evacuated.

The cause of the incident is not known. No one was injured in the incident.

[fire - consequence, mixing, evacuation, unidentified cause]

Lessons

[None Reported]

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

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Location : Bowling Green, USA

Injured : 40+ **Dead :** 0

Abstract

An unknown amount of sulphuric acid mixed with an amniotic shield conditioner spilled at a plastics coating plant injuring at least forty people and leading to the building being evacuated. The forty workers injured in the incident were treated for the effects of fumes. Clean-up of the plant is now underway.

[evacuation, gas / vapour release, injury, unidentified cause]

Lessons

[None Reported]

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

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Location : Rogers City, USA

Injured : 0 **Dead :** 0

Abstract

A fire occurred at a warehouse containing unknown amounts of fertilisers, herbicides, insecticides and pesticides. The fire totally destroyed the building. The cause of the fire is not known.

A half-mile area surrounding the fire was evacuated as a precaution.

[fire - consequence, warehousing, evacuation, unidentified cause]

Lessons

[None Reported]

1284017 July 2000

Source : BBC NEWS, 17 JULY, 2000, (<http://www.bbc.co.uk>).

Location : Ho Chi Minh City, VIETNAM

Injured : 10 **Dead** : 16+

Abstract

A road transportation incident. A bus carrying chemicals exploded killing at least sixteen people and seriously burning ten others.

The cause of the explosion is not known but approximately twenty containers of unknown chemicals were on board at the time of the incident.

[fatality, explosion, burns, unidentified cause, injury]

Lessons

[None Reported]

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

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Location : Deerfield Beach, Florida, USA

Injured : 0 **Dead :** 0

Abstract

A chemical fire occurred at a laboratory. Fire fighters used dry-chemical extinguishers as they feared that the chemicals involved may react with water. The cause of the fire is not known.

[fire - consequence, laboratory work, unknown chemicals, unidentified cause]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

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

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

Lessons

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

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

1. Relocate vent line from a point just above valve No.12 out through the building to a point a safe distance away. The lateral piping would be installed at a sufficient angle to avoid low spots in the line.
 2. Relocate eductor pump to minimise hazards which would occur in the ethyl building from leakage at the pump.
 3. Ventilation in the ethyl building will be improved as much as possible.
 4. Fire protection - an investigation to determine the feasibility of a fail-safe interlocking device to prevent operation of the gasoline wash valve unless vent valves are closed.
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Source : CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD, 29 JULY, 1999. (<http://www.chemsafety.gov>).

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Location : Port Comfort, Texas, USA

Injured : 35+ **Dead :** 0

Abstract

An explosion and fire occurred at a chemical plant, injuring at least 35 people. The incident occurred when a processing tank exploded for unknown reason.

An investigation is being carried out.

[fire - consequence, injury, unidentified cause]

Lessons

[None Reported]

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

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Location : Harrisburg, USA

Injured : 0 **Dead :** 0

Abstract

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

[spill, unidentified cause]

Lessons

[None Reported]

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

Location : ,

Injured : 1 Dead : 0

Abstract

One fire fighter was injured and 3000 people evacuated following a fire at a fertiliser plant. The fire burned for over sixteen hours before being brought under control. The cause is still unknown, however the two explosions which rocked the plant are thought to have involved propane gas tanks.

Fire fighters chose not to douse the flames due to the fear that runoff water would pollute the nearby river. The site contained chemicals including, methyl bromide, ammonium nitrate, paraquat, endosulphan and carbofuran and 400 tonnes of ammonia nitrate bagged on-site. A decision was made to let the fire burn out most of the pollutants before finally being extinguished.

[injury, unidentified cause]

Lessons

[None Reported]

Source : LLOYDS LIST, 12 NOV, 1997.

Location : , USA

Injured : 1 Dead : 0

Abstract

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

Lessons

[None Reported]

1196415 July 1995

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

An overflow occurred on a tank containing bitumen and white spirit when water flowed into the tank. The maximum possible overflow for the tank was 4.5 tonnes containing 43% white spirit. It is not known why the water flowed into the tank.

It is thought that the majority of the material was retained on site but an unknown amount was lost into the nearby river causing a slick.

[spill, unidentified cause]

Lessons

6621 07 July 1994

Source : HSE REPORT, STATEMENT OF NUCLEAR INCIDENTS AT NUCLEAR INSTALLATIONS. 5, JAN.1995

Location : Windscale, UK

Injured : 0 **Dead** : 0

Abstract

A flask handling uranium oxide leaked contaminated water when moving from vertical to horizontal position. Quantity spilt exceeded notification level but was termed level 0 no safety significance. The water came from an unknown source.

[spill, unidentified cause]

Lessons

[None Reported]

6039 20 April 1993

Source : LLOYDS LIST, 1993, 21 APR.

Location : Kythnos Island, GREECE

Injured : 0 **Dead** : 0

Abstract

20 mile by 20 yards oil spill from unknown source.

[unidentified cause]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 129, 11; HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1991, AUG.; LLOYDS LIST, 1991, 21 JUN.

Location : Dhaka, BANGLADESH

Injured : 30 **Dead** : 7

Abstract

The failure of a welded joint between a carbon dioxide stripper and the main cylindrical body resulted in the release of high pressure gas, which consisted of ammonia, carbon dioxide, and carbamate liquids. Subsequent to the release, an explosion resulted which caused significant damage to this fertiliser plant. The source of ignition for this explosion is unknown. Fatality.

[weld failure, damage to equipment, injury, unidentified cause]

Lessons

[None Reported]

10245November 1990

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An explosion and fire occurred in the reactor section of an ethylene plant causing the olefins unit to be shutdown. The explosion sent a fireball and cloud of smoke about 50 feet over the plant. Fortunately there were no injuries and no evacuations.

The cause of the incident was due to heated, pressurised hydrocarbons which are used in the manufacture of alpha olefin, which is used to make detergents.

The explosion occurred when hydrocarbons were ignited. Ignition source unknown.

It took less than an hour for workers to cut off all the valves feeding hydrocarbons to the damaged site. Hydrocarbons remaining in the blast area were released and burned in controlled flares.

[fire - consequence, reactors and reaction equipment, unidentified cause]

Lessons

[None Reported]

5057 19 July 1990

Source : LENOIR E.M & DAVENPORT J.A, A SURVEY OF VAPOUR CLOUD EXPLOSIONS SECOND UPDATE, PROCESS SAFETY PROGRESS, 1993, 12, (1), 12-33.

Location : Cincinnati; Ohio, USA

Injured : 63+ **Dead** : 2

Abstract

An explosion and fire occurred at a coatings plant killing one worker, injuring approximately 70 other people and causing considerable damage to the neighbourhood. A reactor in the resin building was being cleaned with a solvent when a ruptured valve or pressure seal failure released the vapour cloud into the building. The exact cause of ignition is still unknown but could be due to the area being near a boiler room where gas generators, electrical switches could have created a spark. There was a build-up of pressure in the reaction as a result of the improper setting of a valve. The company fined \$1.7 million for 133 safety and health violation.

The company criticised for not equipping kettles in the plant with alarm devices for excessive temperature and pressure, not furnishing kettles with automatic high temperatures and high-pressure shutdown devices, not requiring that an operator be present during kettle use and not having written instructions for kettle cleaning.

[unidentified cause, reactors and reaction equipment, gas / vapour release, damage to equipment, fatality, injury]

Lessons

[None Reported]

4700 05 September 1989

Source : LOSS PREVENTION BULLETIN, 099, 3; SAN FRANCISCO CHRONICLE, 1989, 6 SEP.; LLOYDS LIST, 1989, 7 SEP.; HAZARDOUS CARGO BULLETIN INCIDENT LOG, 1989, OCT.

Location : Martinez; California, USA

Injured : 2 **Dead :** 0

Abstract

An explosion or fire occurred in a hydrotreater unit which was processing FCC (Fluid Catalytic Cracking) feedstock. A failure occurred in a pipe downstream from a separator, resulting in the release of hydrogen and hydrocarbons in the unit area. The cause of line failure is unknown.

[cracking equipment, pipeline failure, unidentified cause, injury]

Lessons

[None Reported]

Source : DAILY TELEGRAPH, AUG 21, 1989, AUG 22, 1989,; LLOYDS LIST 22/08/89, 23/08/89, 24/08/89 AND 25/08/89.

Location : , UK

Injured : 0 Dead : 0

Abstract

One hundred and fifty tonnes of crude oil escaped from a 12 inch pipeline under the river. The pipeline carried crude oil from the terminal to a refinery. The spill caused pollution and ecological damage along a 50 km stretch of the estuary, threatening the breeding grounds of tens of thousands of birds. The clean-up costs and likely damages payments were expected to reach about £1m (1989).

The company was criticised for delays in providing clean-up equipment. The leak was the third involving different pipelines in the estuary during the previous 3 years.

[transportation, pipeline failure, unidentified cause]

Lessons

An independent committee was set up to study the impact of the leak and identify lessons for future spillages.

4628 03 July 1989

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

Location : Decatur; Alabama, USA

Injured : 2 **Dead** : 3

Abstract

An explosion of a chemical mixing vat. Fatality
[unknown chemicals, unidentified cause, injury]

Lessons

[None Reported]

4587 27 May 1989

Source : LLOYDS LIST, 1989, 30 MAY.

Location : Thatcham; Berkshire, UK

Injured : 0 **Dead** : 0

Abstract

A fire occurred at a plastics factory which led to fears that chemicals would get into drainage system.

[fire - consequence, drains & sewers, unknown chemicals, unidentified cause]

Lessons

[None Reported]

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

Location : Karachi, PAKISTAN

Injured : 0 **Dead** : 0

Abstract

A fire occurred at a bonded warehouse containing chemicals and cotton waste.

[warehousing, fire - consequence, unknown chemicals, unidentified cause]

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.
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4198 21 June 1988

Source : FIRE PREVENTION,NO. 211; PURDY G & SMITH E.J, THE LESSONS LEARNT FROM EMERGENCIES IN THE U.K. INVOLVING HAZARDOUS CHEMICALS, EMERGENCY PLANNING 91, SYMPOSIUM, SEP,1991,; HAZARDOUS CARGO BULLETIN, JAN, 1989.

Location : Poole; Dorset, UK

Injured : 14 **Dead** : 0

Abstract

A fire and explosion involving drums of unknown chemicals occurred in a main chemical warehouse at a chemical factory. Five of the drums of solvents that were blown into the air, landed close by. The majority of drums fell back within the storage area.

Nearby buildings were damaged by the blast.

An investigation into the incident found that lack of segregation in the storage of a vast range of chemicals led to the extremely rapid and violent spread of the fire.

[warehousing, fire - consequence, unidentified cause, injury]

Lessons

The following recommendation was made:

Ensure that segregation policy for chemicals is clearly set out and fully implemented, especially in the respect of off-specification or waste materials.

Source : ICHEME

Location : , USSR

Injured : 55 Dead : 0

Abstract

A rail transportation incident. A train carry unknown chemicals derailed causing the release of triethylamine.

The incident occurred when the goods train unexpectedly left the rails on approach to a bridge over a river. The train derailed 150 m from the river bank, two goods wagons and three tank cars left the track causing one to rupture. Approximately 740 l of triethylamine was released. Three thousand people were evacuated from their homes.

Fifty five people were taken to hospital for treatment. The spillage did not reach the river.

[derailment - consequence, gas / vapour release, unidentified cause, injury]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 084, 19-21.

Location : ,

Injured : 5 Dead : 0

Abstract

A serious fire broke out in a chemicals store at a plant.

Substantial damage was caused by the fire to materials stored in the oxidising bay but by examination of records, questioning staff and analysis of what remained it proved possible to obtain a break down of the materials stored in the oxidising store on the day of the fire which was adequate for the purpose of the investigation.

During the investigation it became clear that incompatible materials had been placed too close to each other inside the stores building, despite the works original intention to segregate chemicals on the basis adopted for transportation purpose by international codes. In particular the system appears to have been overloaded by the scheme adopted for sorting returned and off specification materials for disposal. As a result, the fire spread extremely rapidly and violently.

Within minutes the fire, had penetrated the exterior walls of the oxidising materials store and involved the drums of flammable liquids stored in the open area outside, despite the practice for storing drums of non-flammable materials adjacent to the store building.

[fire - consequence, storage, damage to equipment, unknown chemicals, unidentified cause, injury]

Lessons

The following recommendations were made:

1. The decision to co-locate the oxidising materials section of the production stores building and the drum storage area for flammable liquids was flawed in that the end wall of the store was not capable of preventing fire breaking through to the drum storage area. The building met the building regulations in force at the time.
 2. The storage practices adopted, failed to cope with the problems created by the need to store, sort and dispose of the vast range of chemicals returned by customers, manufactured off specification or otherwise for disposal.
 3. A number of chemical routes to ignition in the event of leakage or spillage or exothermic reactions were present in the oxidising store on the day of the fire. The precise route to ignition cannot be identified with certainty.
 4. Once the ignition had occurred fire spread was inevitably rapid because of the lack of segregation within the building and the lack of adequate thermal barriers between the oxidising store and the drum storage area.
 5. The smooth handling of the incident by the emergency services, local council and works, demonstrated the importance of good emergency planning.
-

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An operator noticed smoke and flames at the top of the bitumen unit HTO system reservoir (above the HTO circulating pumps). Two other operators arrived at this time and the Fire Station was telephoned to ask that a fire hose be sent down to the unit as the equipment sited there was not capable of reaching that height. The Fire Station instructed that the fire siren should be sounded and one of the operators proceeded to call the emergency number.

At this stage the HTO reservoir disgorged oil out of the top of the header tank. The spilled oil spread to the area around the base of the reservoir and ignited.

The operators present used dry chemical extinguishers to prevent the fire reaching the bitumen unit charge pump and air blower. A short time later the Fire Brigade arrived and put out the remainder of the fire at the reservoir base, followed by that at the top of the reservoir.

The incident was investigated fully but the reason for the fire remains unknown. There was no evidence to indicate the oil in the system as anything other than what it should have been or that there was any scale in the area of the fire that could have spontaneously ignited.

[spill, fire - consequence, unidentified cause]

Lessons

This incident highlights a number of points on the philosophy and procedures for fire-fighting:

1. At a minimum there should be hand held equipment eg. 12kg dry chemical extinguishers, on elevated platforms if there is a potential risk of fire. The type of equipment to be located at the operating unit will depend on the fire-fighting philosophy adopted by the installation. Hoses and monitors should be provided at a unit to meet the need for a first aid attack and it is expected that the operators will be trained in their proper use.
2. In the case of fire the emergency procedures should require that an emergency call is made immediately by the accepted means of communication to the designated centre giving the necessary information. The designated centre will in turn arrange despatch of the emergency teams with the appropriate equipment. Even in the case of a small fire which an operator is confident can be extinguished immediately with a hand held extinguisher then the call to the designated centre should still be made before attempting to extinguish the fire.
3. The sounding of a siren or alarm will depend on the installation and the level of the emergency.
4. It is imperative that all persons on site are aware of the various alarms/signals and the emergency procedures.

3881 29 March 1987

Source : TORONTO GLOBE AND MAIL, 1987, 31 MAR.

Location : Calgary, CANADA

Injured : 12 Dead : 0

Abstract

Gas cloud of unknown origin.

[gas / vapour release, injury, unidentified cause]

Lessons

[None Reported]

3825 28 December 1986

Source : LLOYDS LIST, 1987, 2 JAN.

Location : Shropshire, UK

Injured : 0 **Dead :** 0

Abstract

A fire and chemical hazard alert at an electronics factory.
[fire - consequence, unknown chemicals, unidentified cause]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 075, 11-17; EUROPEAN CHEMICAL NEWS, 1986, 24 NOV.; FIRE PREVENTION, NO.196, 1987, JAN./FEB.; LLOYDS LIST, 1986, 3 NOV.NUMEROUS;11-1986

Location : Basle, SWITZERLAND

Injured : 0 **Dead** : 0

Abstract

A warehouse fire. The warehouse originally built for storing machinery and equipment, was officially approved for use as a warehouse for products and chemicals having a flash point higher than 21 degrees C, including agrochemicals, phosphoric esters and mercaptans. From that time on, it was used for this purpose. Only four days before the fire, an officially authorised fire prevention expert made an inspection of the works and found everything in order. On the morning of the accident the fire alarm was raised almost simultaneously by a police patrol and the works safety personnel. The fire in the warehouse spread with extreme rapidity, so rapid that the 10 fire brigades with 160 men could only concentrate on ensuring that it did not engulf neighbouring warehouses and production buildings.

Attempts to extinguish the fire with foam alone proved ineffective and water had to be used. Enormous amounts were required to prevent the fire from spreading further. Which would have had really catastrophic consequences. Roughly 10000 m3 of fire water drained into the nearby river, and with it about 30 metric tonnes of the chemicals stored in the warehouse. Among the chemicals were an estimated 150 kg of highly toxic mercury compounds dissolved in aqueous concentrates. The gases and vapours produced by the fire caused a pungent, offensive odour in parts of the surrounding area. Complaints such as headaches, nausea, burning eyes and respiratory irritations were reported. The fire water contaminated with chemicals passed directly into the river causing severe ecological damage over a length of about 250 km. A great number of fish, principally eels, died, along with part of the micro-organisms on which they feed. On the other hand, considerable amounts of the river's vegetation survived. Unidentified cause.

[fire - consequence, warehousing, spill, mercaptan]

Lessons

Recommendations were made immediately after the fire and the corresponding measures were taken.

The works:

1. Already by the end of 1986, the product of insecticides had been reduced by over 60%.
2. The stocks of agrochemicals are being cut by one-third, or 2300 metric tonnes.
3. The manufacture of all substances which require the use of phosgene has been discontinued. No phosgene had been stored at the works since the beginning of December 1986.
4. The production and sale of all products containing mercury was discontinued world-wide as from 1st January 1987.
5. All agrochemicals manufactured and/or stored at the works are being reviewed as to whether they are to be retained in the product range or withdrawn.

The most important criteria in this study are: agricultural, utility, profitability, toxicity and combustion properties.

Groupwide, the safety regulations for storing toxic and flammable substances have been re-defined. These regulations take into account:

1. The characteristics of buildings and their equipment.
2. Storage density, storage volume and storage procedures.
3. Packaging materials and storage records.
4. Retention of the fire extinguishing water in case of fire.

On longer duration and of greater seriousness than the material damage are the psychological consequences of the disaster. A major fire developed into an ecological disaster. This also caused the loss of confidence in the population in the and around the vicinity of the works.

The company therefore feel obligated to re-think and re-evaluate their priorities to keep the public informed about the results of their evaluation and its consequences, to regain and maintain the people's trust.

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

During the manufacture of an organic compound in a batch reactor, the temperature rose from a control level of 80 degrees C to an actual level of 120 degrees C.

It was known that the reactor contents would ignite in the presence of oxygen at elevated temperatures. The reactor was fitted with a nitrogen purge system (including an in-line oxygen analyser for the off-gas). In order to control the situation, the supervisor increased purge rates and this led to odour complaints from local residents. The reactor was brought under control without further incident.

Subsequent internal examination of the reactor and product showed no signs of smouldering or combustion.

[batch reaction, unidentified cause, gas / vapour release, chemical - organic]

Lessons

The conflicting evidence prevented a clear analysis of the problem. Improvements in monitoring off-gas temperature and composition were suggested. Off-gas scrubbing was also improved.

3589 13 April 1986

Source : LLOYDS LIST, 1986, 15 APR.

Location : Guatemala City, GUATEMALA

Injured : 0 **Dead** : 0

Abstract

A fire occurred in a warehouse included fertilisers, plastics, propane gas, paper and unknown chemicals. Damage estimated at \$2 million (1986).
[fire - consequence, warehousing, unidentified cause]

Lessons

[None Reported]

1272917 March 1986

Source : MANCHESTER EVENING NEWS, MARCH 18, 1986.

Location : Lancashire, UK

Injured : - **Dead** : 0

Abstract

A fire occurred at a chemical plant releasing a hydrochloric acid cloud over a residential area forcing the evacuation of residents.

Half the building was destroyed in the fire and an investigation into the cause is underway.

[fire - consequence, gas / vapour release, unidentified cause]

Lessons

[None Reported]

3481 1986

Source : ENVIRONMENTAL EMERGENCIES: A REVIEW OF EMERGENCIES AND DISASTERS INVOLVING HAZARDOUS SUBSTANCES OVER THE PAST TEN YEARS, UNITED NATIONS CENTRE FOR URGENT ENVIRONMENTAL ASSISTANCE, UNITED NATIONS ENVIRONMENT PROGRAMME, 1993

Location : , TADZHIKSTAN

Injured : 0 **Dead :** 0

Abstract

An unknown amount of chlorine was released from an electrochemical plant, causing extremely high air pollution up to 1.5 km from the plant, damaging human health and agricultural land.

[gas / vapour release, pollution, unidentified cause]

Lessons

[None Reported]

Source : COMMUNITY DOCUMENTATION CENTRE ON INDUSTRIAL RISK, MAJOR ACCIDENT REPORTING SYSTEM LESSONS LEARNT FROM ACCIDENTS NOTIFIED, INSTITUTE FOR SYSTEMS ENGINEERING AND INFORMATICS, COMMISSION OF THE EUROPEAN COMMUNITIES JOINT RESEARCH CENTRE, 1991, ISBN 9282622894.

Location : ,

Injured : 0 **Dead :** 0

Abstract

The storehouse of chemical fertilisers was a hangar subdivided into 8 compartments, divided one from the other by wooden walls. The different compartments contained composed fertilisers of different types and ammonium nitrate. In one of the compartments, where several hundred tonnes of composed fertilisers were stored, a fire occurred at 5 a.m. The cause of the fire is still unknown. The rapid intervention of the fire brigade limited the fire to this compartment. The smoke produced took some hours to disperse. Fortunately, due to the wind direction, it was not necessary to evacuate the population.

[fire - consequence, storage, unidentified cause]

Lessons

[None Reported]

Source : COMMUNITY DOCUMENTATION CENTRE ON INDUSTRIAL RISK, MAJOR ACCIDENT REPORTING SYSTEM LESSONS LEARNT FROM ACCIDENTS NOTIFIED, INSTITUTE FOR SYSTEMS ENGINEERING AND INFORMATICS, COMMISSION OF THE EUROPEAN COMMUNITIES JOINT RESEARCH CENTRE, 1991, ISBN 9282622894.

Location : ,

Injured : 1 **Dead :** 0

Abstract

A marine transport incident. The accident occurred after the loading of a ship tank with benzene. During the let-down of the sampling equipment, the explosion occurred. The walls of the tank were deformed. The person charged with the sampling was injured. Burning of benzene followed. Several tens of tonnes of benzene ended up in the river. Shortly afterwards there was the explosion of an empty benzene tank on land. The primary cause is unknown.

[spill, pollution, damage to equipment, injury, unidentified cause]

Lessons

[None Reported]

3343 04 July 1985

Source : LLOYDS LIST, 1985, 12 JUL.

Location : Melbourne, AUSTRALIA

Injured : 0 **Dead** : 0

Abstract

A chemical fire occurred in a vehicle maintenance workshop.

[fire - consequence, unknown chemicals, unidentified cause]

Lessons

[None Reported]

Source : ICHEME

Location : , FRANCE

Injured : 0 Dead : 0

Abstract

Two explosions followed by a fire in a peroxide storage cell.

The storage facility, for reaction initiators were made up of six separate refrigerated cells. Each cell was separated from the adjacent cell 10m away by a fire wall. The facility was surrounded by a fire wall higher than the top of the cells. The wall on the fire-wall side of each cell is a partition forming a pressure-resistant valve. The incriminated cell contained 5 tonnes of peroxides. The fire, preceded by two explosions was extinguished. The refrigeration and ventilation system as a whole was operating but this was stopped by an electrician. Two possible hypotheses as to the origin of the fire:

1. Inside the cell, spontaneous ignition of the peroxides for an as yet unknown reason.
2. Outside the cell, the power ventilator unit is suspected.

[fire - consequence, refrigerated storage tank, unidentified cause]

Lessons

[None Reported]

1264617 October 1984

Source : LLOYDS LIST, OCTOBER 19, 1984.

Location : ,

Injured : - **Dead :** 3

Abstract

A marine transportation incident. An explosion occurred onboard a 50,975 tonnes deadweight marine tanker causing a fire and the eventual sinking of the tanker. It is not known what caused the explosion.

[fire - consequence, fatality, unidentified cause]

Lessons

[None Reported]

1154907 June 1984

Source : LLOYDS LIST, 8 JUNE, 1984, 12 JUNE, 1984.

Location : Cilacap, JAVA

Injured : 11 **Dead** : 5

Abstract

Five people were killed and eleven others injured when a petrol storage tank exploded at a refinery. The fire began for unknown reasons and was brought under control without spreading to other storage tanks.

[storage tanks, explosion, fire - consequence, fatality, gasoline, injury, unidentified cause]

Lessons

[None Reported]

1141718 March 1984

Source : LLOYDS LIST, 23, 24, MAR, 1984.

Location : , INDONESIA

Injured : 0 Dead : 0

Abstract

A fire started in the chemical store of an oil drilling barge working offshore. The fire was confined to the store itself. However, large quantities of toxic fumes produced from the fire necessitated evacuation of the eighty crew members by helicopter.

The fire could not be extinguished by conventional means and assistance of an international fire fighting specialist was enlisted.

Cause of the fire is unknown.

[fire - consequence, exploration, storage, marine transport, unidentified cause]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

An incident occurred at the refinery involving a 125,000 barrel floating roof tank - Tank A. It has a single deck design which consists of a pontoon ring with 24 compartments. The roof is designed to hold 10 to 12 inch of water without sinking.

On 11 October, Tank A was on its high legs with approximately 4 and a half feet when it received a barge load of crude oil. The crude was off-loaded into the tank at 3,000 BPH and after about 30 hours, a pumper noticed that the roof was sinking. Oil was coming out of the roof drain and all but one or two pontoons were submerged. When the roof sank, all of the hatch covers came off and all pontoons with the exception of one or two that stayed out of the liquid filled with oil. The level was slowly pumped out to 10-12 feet and then an air driven pump was lowered into each pontoon and pumped them out one at a time allowing the roof to level out. The roof was creased from SW-NE with major apparent damage to the centre skin. The SW quadrant was damaged the worst due to the collapse of the legs. 600 barrels of crude oil was lost.

[spill, product loss, loading, storage, unidentified cause]

Lessons

A definite primary cause is unknown. A possible opinion is that the roof hung up during filling and oil was able to fill one compartment at a time until the roof sank. It was also noticed previously that during rain, a water puddle forms causing the roof to tilt.

To prevent a recurrence, an inlet distribution nozzle to limit incoming velocity to 3 feet per second as a precautionary measure was installed and the new roof was floated to the top on water and the clearances throughout the test before recommissioning the tank were measured.

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

A break in a 300 mm pipeline resulted in a spill of about 250,000 gallons (6,000 barrels) of crude oil.

The oil was carried down irrigation canals into a nearby river and reservoir. Preliminary reports indicated that neither wildlife nor farmlands were seriously affected.

The cause of the rupture was not known at the time of this report.

[pollution, ecological damage, unidentified cause, pipeline failure]

Lessons

[None Reported]

1055821 March 1982

Source : THE TIMES, MAR 29, 1982.

Location : Edinburgh, UK

Injured : 0 Dead : 0

Abstract

Barrels of explosive chemicals, oxidizing agents and poisons, including antimony and arsenic sulphide, had been sealed in a concrete bunker in 1970 when a derelict fireworks factory was levelled to make way for a domestic refuse tip. An explosion on the site left a crater 40 ft deep and 90 ft across and showered debris over a large housing estate.

[storage, underground storage, unknown chemicals, unidentified cause, unidentified cause]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, FEBRUARY, 1982.

Location : Mombasa, KENYA

Injured : 0 Dead : 0

Abstract

A marine transportation incident. A cargo ship was declared a total constructive loss after a fire which broke out during discharge operations in Mombasa harbour. The fire broke out in the No. 4 hold, which contained, amongst other things, general cargo, cars, second hand clothes, just under 100 drums of sodium sulphide and an unspecified quantity of oxidising chemicals. The sodium sulphide drums exploded while the fire was raging, spreading flames to the adjacent hold. Fire brigades at the port and from the local area were unsuccessful in putting out the blaze, so the ship was moved from the quayside to the fairway where fire fighting tugs continued to pump water into her holds. It took 4 days to extinguish the fire.

[fire - consequence, unloading, explosion, unknown chemicals, unidentified cause]

Lessons

A Board of Enquiry was set up to investigate the cause of the fire.

Source : HAZARDOUS CARGO BULLETIN, FEBRUARY, 1982.

Location : , SINGAPORE

Injured : 3 **Dead :** 0

Abstract

A marine transportation incident. A 12 year old large Chinese registered bulk carrier was rocked by a series of internal explosions before a fire broke out the length of the ship. The crew escaped, although three people were seriously burned. The ship was located in the harbour, when the fire became so severe that the ship was towed to shallow waters and beached. The ship was carrying steel plate and a range of unknown chemicals on board. The exact cause of the incident was not clear. The ship was eventually scrapped. The value of the loss cargo was placed at US\$20m (1982).

[fire - consequence, product loss, unidentified cause, injury]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 054, 32.

Location : Carlybrook, UK

Injured : 1 **Dead** : 1

Abstract

A plant erupted shortly after midnight. Exploding drums of unknown chemicals were hurled into the air. A thousand residents were evacuated. As the villagers returned home another explosion occurred sending a fireball into the air.

[evacuation, fatality, fire - consequence, fatality, unidentified cause, injury]

Lessons

[None Reported]

2083 07 November 1980

Source : CHEMICAL AGE, 1980, 7 NOV.

Location : Decine; Lyon, FRANCE

Injured : 2 Dead : 2

Abstract

A fire occurred at a research laboratory where chemicals, soda and solvents, were being neutralised in agitator. Fatality.

[laboratory work, fire - consequence, unknown chemicals, unidentified cause, injury]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A fire occurred on an isolation valve in the exhaust pipework of a reactor on a low density polyethylene (LDPE) plant.

The line could not be extinguished until the process stream had been suitably purged with nitrogen.

An investigation into the incident concluded that equipment failure had resulted in a release of hydrocarbons which were ignited by an unknown source.

[fire - consequence, reactors and reactio equipment, unidentified cause]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

Road transportation. An under-inflated or punctured tyre caught fire. Due to the internal heat it re-ignited several times and when the vehicle's extinguisher was exhausted the blaze spread to the load of chemical containers. Both the containers and the truck were destroyed.
[fire - consequence, damage to equipment, fire extinguisher, unknown chemicals, unidentified cause]

Lessons

Maintain correct tyre pressures and carry fire extinguishers suitable for tyre fires. In addition; the size and type of dry powder extinguisher should be reviewed and the possibility of fitting temperature or pressure sensors should also be investigated.

Tyre maintenance and correct tyre pressures can help avoid vehicle accidents. The inside tyre on twin wheels must not be neglected: there should be no difficulty in checking this provided the wheels have been fitted correctly.

Attention should also be drawn to the importance of training drivers in the correct use of vehicle fire extinguishers.

Source : ICHEME

Location : , USA

Injured : 0 Dead : 0

Abstract

An explosion took place in the firebox of a boiler on a refinery site whilst it was being warmed up after a scheduled shutdown. Four pilot burners and two main burners had been alight for several hours under manual control when it was noted that temperatures began to drop. Shortly afterwards the explosion occurred, causing considerable damage to equipment.

Boiler fuel was 'plant gas' containing about 50% hydrogen. The boiler was not fitted with a flue gas combustibles analyser.

The cause of the explosion was not clear, although it appears that incomplete combustion must have allowed a build-up of fuel gas. Possible explanations were:

1. Loose scale left in the fuel gas lines after cleaning, causing incorrect burner operation.
2. Restricted air supply (possibly due to premature commissioning of the air preheater).

[start-up, commissioning, furnace, boiler explosion, unidentified cause, inspection inadequate, design or procedure error]

Lessons

The main changes implemented as a result of the enquiry were:

1. More careful inspection/cleaning of the fuel lines after shutdown.
 2. More careful monitoring of boiler start-up.
 3. Better instrumentation.
-

Source : ICHEME

Location : , UK

Injured : 0 Dead : 1

Abstract

On the 28th July 1977, a contractor's foreman steeplejack fell some 20m from a bucket and received injuries, from which he died immediately.

Work was in hand to replace some 17m of brickwork at the top of one of the refinery power stations boiler stacks. This had progressed to the stage where access ladders had been positioned up to the top of the stack, and rigging was being installed in order to transfer brickwork to and from the stack to by means of a materials bucket.

The foreman entered the materials bucket to act as ballast and it was raised to a height of some 20m to check the line of rigging to ensure adequate clearance for the bucket. Two other employees of the contract were involved in controlling the winch and co-ordinating the ascent. Statements from these two men established that the procedure of using a man as ballast was common practice. Neither saw the foreman fall from the bucket.

After the incident the bucket was found to be upside down in the discharged position.

Subsequent investigation established that:

1. The bucket was designed for the use of transporting materials and was not meant to be used for personnel.
2. The bucket was in good condition, and its locking device operated satisfactory with both forks free of any distortion. The bucket was in a tilted position.
3. No failure had occurred in the associated equipment, e.g. rigging, wires, pulleys, winch, all the equipment either being owned by or on hire to the contractor.
4. The foreman was an experienced steeplejack, having been with the same employer since 1961, and was entrusted by his employers to carry out supervision of contract work.
5. Weather conditions were good at the time of the incident, although there was some wind.

Although a number of investigations were carried out it was not possible to establish how the materials bucket locking device became unlocked, or in which direction the deceased was standing in the bucket, i.e. with his back or face to the locking device. The accident would not have occurred if the contractors regulations forbidding the use of the materials bucket for personnel had been adhered to.

[maintenance, lifting equipment, unidentified cause, fall, fatality]

Lessons

The safety features and regulations of use for equipment designed for lifting personnel are very much more onerous than those for the lifting materials only.

The above incident is a classic example (but by no means unique) of the breaking of such regulations.

Whilst such elevated work is normally solely the concern and responsibility of a contractor, refineries should take note of the incident and ensure that they never place their employees in a similar situation.

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A fire occurred in an acid chlorine plant. The incident occurred when acid chloride vapours ignited in the distillation column. The cause of the incident is unknown.

[fire - consequence, gas / vapour release, unidentified cause]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 1 **Dead :** 0

Abstract

Acid wash tower incident. A fitter was sprayed with liquid whilst removing suction spool on an AN plant. The suction block valve was partially blocked and the pipework was under 4-5 psig. A recently modified shut-down procedure was being followed.
[unknown chemicals, spill, unidentified cause, injury]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 1 Dead : 0

Abstract

A 30ft. section of the 10 inch overhead rundown line on a crude oil distillation unit was required to be cut out and renewed. The line was supported by a hanger and slide. Gas freeing operations were completed and a hot work permit was issued. Electric arc cutting started at 11:10 hr, and when the pipe was almost cut through, the welder stopped work and moved back to await crane support before completing the cut.

At 12:20 hr the 30ft section of 10 inch line fell from its support, onto the pipe track below and in doing so struck a 1 inch bypass line around the LPG product flow controller. The 1½ inch line was wrenched from its 1½ inch API Socket and there was an immediate release of LPG which ignited. The LPG burned for about two minutes until the 3 inch section of the line between the battery limit and flow control valve had depressured.

The welder jumped off the overhead piperack at the beginning of the incident and sustained a fractured ankle.

Fire Department personnel observed the ignition of the LPG from their Station and were quickly on the scene applying cooling water to an adjacent column structure, and extinguishing smouldering material.

It was extremely lucky that the section of LPG line struck by the falling 10 inch line contained only a limited quantity of LPG. Had there been a long section of line back to isolation valves, or the 3 inch line itself had been struck, the fire would have been more difficult to control and extinguish.

[maintenance, pipe, unidentified cause, fire - consequence, LPG]

Lessons

[None Reported]

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.

1208 July 1976

Source : CHEMICAL AGE, 1976, 23 JUL.

Location : Pontypool, UK

Injured : 0 **Dead** : 0

Abstract

Fire in warehouse. Unidentified cause.

[warehousing, fire - consequence]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A rail transportation incident. A rail tanker containing ethylene oxide cracked (cause unknown) following a rise in pressure. The leak ignited and explosion caused considerable damage over a 300 m radius.

[damage to equipment, unidentified cause]

Lessons

[None Reported]

Source : ICHEME

Location : , UK

Injured : 0 Dead : 0

Abstract

A marine transportation incident. An explosion occurred as a marine tanker completed loading propane. The explosion, in the electric motor room, blew a deck cover onto the jetty, and damaged the mast, bulkheads and bulkhead doors. The ensuing fire was quickly extinguished. The cause of the accident was not identified.

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

Lessons

[None Reported]

1167413 October 1975

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

An incident involving a new plant and a major spillage of LDF fortunately did not result in ignition.

During the night-shift of 13th October 1975, approximately 160m³ of LDF escaped through a parted flanged joint at the battery limit of this recently constructed deisopentaniser Unit. The bulk of the spillage was trapped in a sub-surface pit on the unit and approximately 152m³ was subsequently recovered.

Before the incident, pumping operations had been carried out using a line from which the deisopentaniser feed line branched off. The lines involved had been checked for leakages by the tank farm operators before the product transfer. However, the checking did not include the battery limit valves of the new deisopentaniser unit, because this area comes under the responsibility of that unit's operators. Also, in this instance the tank farm operators did not inform the shift supervisor of start of pumping. It could not be established why the flanged joint had been parted and why the deisopentaniser unit feed line had been certified "clear for commissioning."

Recovery of the LDF was handled very carefully to prevent ignition. On discovering the spillage, the electrical supply for the flooded area was isolated at the sub-station, and the LDF blanketed with foam. The unit drainage system although completed was not open to the refinery drainage system and hence, as stated, the bulk of the spillage was trapped in a sub-surface pit. It was recovered by using a combination of a portable pump with a flameproof motor and a vacuum tanker, after establishing that a dangerous atmosphere existed only very close to the surface layer of the LDF in the pit.

Fortunately the cold ambient conditions reduced the vapourisation risk.

[material transfer, flange, spill, unknown chemicals, unidentified cause]

Lessons

[None Reported]

1021 20 May 1975

Source : ISBELL J.R, FAILURE IN AMMONIA PLANT TRANSFER LINE, AMMONIA PLANT SAFETY VOL.19, 1977, 144-147.

Location : Kerens; Texas, USA

Injured : 0 **Dead** : 0

Abstract

A tee in the primary to secondary reformer transfer line ruptured suddenly and violently causing an immediate shutdown of the ammonia plant. No precise cause for the failure was found. The general problem is discussed. Unidentified cause.

[plant shutdown]

Lessons

[None Reported]

Source : ICHEME

Location : , USA

Injured : 8+ Dead : 0

Abstract

A road transportation incident. A fire occurred on a tank truck. The first fire crews called to the incident found that the undercarriage of the trailer was involved, including all of the tires of the far left side. This part of the fire was quickly extinguished.

The back doors were then forced open. Pallets of an unknown material were found piled up at the rear of the truck. The containers on the pallets were paper sack very similar to concrete bags.

It was found that the fire was mainly involved in rolls of cloth packed behind the pallets and the containers of the material were becoming increasingly involved in the fire.

The material was found to be tris (2 hydroxyethyl) isocyanurate.

[fire - consequence, unidentified cause, injury]

Lessons

[None Reported]

Source : PIPELINE ACCIDENT REPORT, NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON D.C, USA, REPORT NUMBER, NTSB-PAR-74-1, 1974.

Location : Coopersburg; Pennsylvania, USA

Injured : 16 **Dead** : 5

Abstract

Transportation. A natural gas pipeline was ruptured by dynamite and gas at 50 psig entered a building and exploded. The probable cause of the explosion and fire was the ignition, by an unknown source, of an accumulation of gas which leaked from an acetylene weld in an 8 inch pipeline after the weld had been cracked by the detonation of excessively heavy and closely positioned dynamite charge, in use on a construction project. Fatality.

[unidentified cause, injury]

Lessons

[None Reported]

Source : ICHEME

Location : ,

Injured : 0 Dead : 0

Abstract

A batch of benzyl was dried in a paddle drier for 28 hours at 120 degrees C and then discharged. About 36 hours later, the dyestuff started smouldering, evoking thick yellow smoke. The container was taken into the open and flooded with water. A second container, which had become warm, was also taken into the open. The drier, which already had been charged with a further batch, was cooled.

No one was injured. A part of the dyestuff batch was destroyed. The cause of the fire is unknown.

[fire - consequence, gas / vapour release, damage to equipment, dyestuffs, unidentified cause]

Lessons

[None Reported]

Source : CHEMISTRY AND INDUSTRY, 1978, MAY.

Location : Emmerich, GERMANY

Injured : 0 **Dead** : 0

Abstract

An explosion with unknown cause occurred in a storage tank of hydrogen peroxide.

[storage tanks, unidentified cause]

Lessons

[None Reported]

Source : LOSS PREVENTION, VOL. 3.

Location : ,

Injured : 0 Dead : 0

Abstract

An explosion occurred in a nitrogen wash cold box (outside the equipment) after a several day cold shutdown followed by a derime with nitrogen. It is assumed that ice may have split tubes permitting carbon monoxide and hydrogen to leak into the perlite installation. It is likewise assumed that the insulation had channelled and had many voids. However, the insulation was continuously purged with nitrogen and the mechanism of the explosion is still unknown.
[unidentified cause]

Lessons

[None Reported]

9812 15 August 1967

Source : LOSS PREVENTION, VOL. 3.

Location : ,

Injured : 0 Dead : 0

Abstract

Stored bagged sodium trichloro acetate decomposition and caught fire from an unknown cause. Acid fumes caused much damage to the building and equipment.

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

Lessons

[None Reported]

Source : ICHEME

Location : Atlantic Ocean,

Injured : 0 Dead : 0

Abstract

A marine transportation incident. An explosion occurred on board a marine tanker, blowing the ship in half. The cargo consisted of isopropanol, soil fumigant, acetone and carbon tetrachloride. An explosive, gaseous mixture built up through the vaporization of remaining benzole during cleaning of a tank. This mixture was ignited by an unknown source.

[unidentified cause]

Lessons

Recommendations:

1. Immediate measures:

2. Material of hoses should be tested for electrical conductivity each time before being used for tank cleaning. Non-conducting hoses should be destroyed.

Actions should be recorded in the ship's log book.

3. Electrical sockets on deck should be dead during gas-freeing operations. Controls carried out should be recorded in the ship's log book.

4. Handling of non-sparkproof tools should be strictly prohibited on deck during gas-freeing operations.

5. Gas-freeing operations should be prohibited on tankers while there is still cargo on board. Tank cleaning operations should not commence before discharge has been completed.

6. Working simultaneously with water and steam in a tank should be prohibited until experts have ascertained that there is no danger of explosion in spite of a sudden energy build-up through cooling of the steam with cold water and in spite of a possible electrostatic discharge. Cleaning with water and gas-freeing with steam should be done in two separate operations - water followed by steam.

7. The Captain should be supplied with precise information on the cargo properties (flashpoint, etc). Information should be provided on the procedure to be followed for evacuating the gas from the tanks after discharge of the cargo. To ensure that the condition of the tank, before the cargo is loaded, is such that it will not affect the quality of the cargo, it is inspected by specialists appointed by the consignor. However, it is still left to the Captain and crew to restore the tanks to this condition.

8. Suggestions to scientific and specialized authorities:

9. A research programme to address the subject of 'Static charges' should be initiated.

10. When the research work is complete, the authorities should issue regulations stipulating what is permitted and prohibited in connection with tank cleaning.

11. On tankers, there should be sufficient openings in the deck so that the crew do not have to enter the tank during gas-freeing operations to arrange the tank washing machines.

12. An explosimeter can be used to establish whether a tank is free from explosive gases. However, it will not detect gaseous mixtures which might be hazardous to health. Special meters are required for this purpose which are fitted with attachments according to the type of chemicals. Only a chemist can advise on the type of attachments. Therefore a tank should only be entered when it is free from gas and, after adequate ventilation, also free from gaseous mixtures hazardous to health. Handling and maintenance of such meters should be included in the regulations. The Captain should be notified of the equipment to be used for testing. When tank cleaning operations are carried out at sea, the Captain must be able to test the atmosphere for gas.

Source : 100 LARGEST LOSSES A THIRTY YEAR REVIEW OF PROPERTY DAMAGE LOSSES IN THE HYDROCARBON-CHEMICAL INDUSTRIES, MARSH & MCLENNAN PROTECTION CONSULTANTS, 9TH EDITION, 1986.

Location : Marcus Hook; Philadelphia, USA

Injured : 0 **Dead :** 0

Abstract

An explosion in a nitrogen oxide separation unit destroyed the unit and the adjoining hydrogen purification unit. The one storey masonry control building was also destroyed. The ensuing fire involved ethylene, the refrigerant for the separation unit. Deluge nozzles set up by the plant fire brigade kept equipment cool until all of the ethylene had been consumed. Cause of this loss has never been determined.

Estimated loss \$3,000,000 (1956).

[fire - consequence, separation equipment, unidentified cause]

Lessons

[None Reported]

Source : HAZARDOUS CARGO BULLETIN, 1983, DEC.

Location : Holland Tunnel; Jersey City; New Jersey, USA

Injured : 66 **Dead** : 0

Abstract

A road transportation incident. A 16 tonne trailer carrying 80 drums of carbon disulphide caught fire of indeterminate cause around the trailer. Fumes from the drums quickly ignited and led to an explosion. An intense fire ensued and further explosions involving turpentine and alcohol and 10 trucks. Heavy fumes of ammonia, chlorine and carbon dioxide were given off. All persons escaped from the tunnel. 600 ft of tunnel were badly damaged.

[gas / vapour release, unidentified cause]

Lessons

[None Reported]

3126 Date Unknown

Source : ICHEME

Location : ,

Injured : 0 **Dead :** 0

Abstract

A major fire occurred in a chiller/exchanger house of a wax recrystallisation unit. A ground level fire of unknown origin spread rapidly to the drive ends of the scraped chillers and subsequently engulfed the whole building.

Damage is estimated at several hundred thousand pounds.

[fire - consequence, cooling equipment, damage to equipment, processing, unidentified cause]

Lessons

[None Reported]

6995 Date Unknown

Source : LOSS PREVENTION BULLETIN, 015, 16.

Location : ,

Injured : 0 **Dead :** 0

Abstract

A leak of ethylene oxide in a pump house was ignited by an unknown cause, possibly static.

[spill, unidentified cause]

Lessons

[None Reported]

7795 Date Unknown

Source : BARTON J AND ROGERS R, CHEMICAL REACTION HAZARDS, 2ND EDITION, ICHEME, 1997, APPENDIX 1, 184.

Location : ,

Injured : 0 **Dead :** 0

Abstract

During research and early process development work, nitric acid addition rate and reactor temperature were standardised. After several batches and for some unknown reason, the acid was added in half the time, while the intermediate in the reactor was several degrees colder than in previous operations. The delayed reaction at lower temperature permitted an accumulation of reactants followed later by a rapid evolution of heat that the cooling system could not cope with. An explosion occurred.

[batch reaction, reactors and reaction equipment, unidentified cause]

Lessons

[None Reported]

9664 Date Unknown

Source : MANUFACTURING CHEMISTS ASSOCIATION 1970 VOL. 3, CASE HISTORY 1192.; LOSS PREVENTION IN THE PROCESS INDUSTRIES, F. LEES.

Location : ,

Injured : 0 **Dead :** 0

Abstract

An operator checked the level in a storage tank and then began pumping in a volatile monomer from a tank wagon. The vent pipe of the storage tank was blocked, however and a large quantity of monomer flowed out of the dip leg.

[storage tanks, chemicals, spill, material transfer, unknown chemicals, unidentified cause]

Lessons

[None Reported]

8852 Date Unknown

Source : HAZARDOUS CARGO BULLETIN, 1997, AUG, VOL 18, NO.8.

Location : , SINGAPORE

Injured : 1 Dead : 1

Abstract

A fire destroyed a waste treatment and tank container cleaning facility. The blaze involved large quantities of drummed solvents and other chemicals. Two plant workers were severely burnt in the fire and one has subsequently died.

Upon the arrival at the scene, police and firemen were confronted with a major conflagration and exploding drums of chemicals, some of which were propelled 80 metres onto buildings outside the compound.

[fire - consequence, burns, fatality, explosion, unknown chemicals, injury, unidentified cause]

Lessons

[None Reported]

Source : LOSS PREVENTION BULLETIN, 015, 17.

Location : ,

Injured : 9 Dead : 0

Abstract

A leak of flammable gas occurred in a closed-in compressor house. The gas was ignited by an unknown cause and the walls and roof, fortunately of fairly light construction, were blown off.

[fire - consequence, injury, gas / vapour release, unidentified cause]

Lessons

[None Reported]

7088 Date Unknown

Source : LOSS PREVENTION BULLETIN, 022, 116.

Location : ,

Injured : 2 **Dead :** 0

Abstract

Whilst working on a project involving a main sewer, two outside contractors employees were exposed to an unknown waste material in the vicinity of an excavated opening in the pipe. Acute reaction in one man was minor, the other fell unconscious. Hydrogen sulphide was suspected as being the responsible agent.

[injury, unidentified cause]

Lessons

[None Reported]

10408Date Unknown

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

Location : , CHINA

Injured : 0 Dead : 9

Abstract

Nine people were killed in an explosion at a fertiliser plant. A liquefied nitrogen pipeline ruptured crushing victims under the rubble of the collapsing plant. The cause of the incident is at present unknown.

[collapse, fatality, unidentified cause]

Lessons

[None Reported]
