Training Package TP 09/12

Recent Incidents in the Gases Industry in Asia



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Introduction

At the regular Safety Advisory Group (SAG) meetings, members exchange information on accidents/incidents that have occurred . Accident/Incident details discussed at the SAG remain confidential.

The SAG has decided to share the more notable accidents/incidents on a regular basis with the national associations and member companies via the Training Package publications.

These slides contain the summaries, pictures and other relevant information to highlight the root causes and lessons to be learned.

Further Information:

These Training Packages are posted only on the Members Page and are meant for distribution among Members only.

While the best effort is made to provide sufficient information on the accidents/incidents, please contact the SAG (through the Secretary General) if you need further clarifications.



<u>Case 1</u> TYRE FIRE ON CRYOGENIC TANKER

What happened

- The product tanker was on the road with a load of Argon. A team of 2 drivers was on board.
- Fire started at the inside rear axle tyre of the tanker during the trip. When fire was discovered, the driver stopped the vehicle at the side of the highway and attempted to put out the fire using the on-board extinguisher. He also called for help from the emergency services.
- Eight tyres of the tanker were completely destroyed by the fire



Causes of fire

The fire occurred first at the inside rear tyre.

Contributing causes of fire:

- Locked brake on trailer
- Convoluted electrical of wire system of trailer.
- Overheated tyres after a long trip on the road







Left tyres

Left brakes



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Key lessons

Preventive Maintenance:

Good maintenance of brakes, tyres and wheels, and proper tyre pressures will help prevent or reduce fire on tyres.

Emergency Response:

While a first response is to consider using the on-board fire extinguisher to put out the fire, the driver should bear in mind the potential hazards from a bursting tyre which may extend 4 metres in all directions from the tyre (See EIGA Safety Information 17/07).



Useful reference: EIGA Safety Info 17/07



Prepared by the Working Group Transport (WG-1)

Safety info 17/07/E

Prevention of Accidents due to overheated or burning Tyres

Transport vehicle tyre fires mainly occur when travelling on highways, but may also break out when parked after travelling.

1. Causes and effects of tyre fires

There are various causes for the overheating and ignition of a tyre, including:

- · badly adjusted or badly maintained brakes,
- · poorly maintained, or failure of, axle component(s),
- · overloading of the vehicle,
- inadequate inflation of the tyres,
- · loss of inflation of the tyre whilst travelling,
- · overloading of one twin tyre when the other deflates,
- excessive use of the brakes,
- · tyres in bad condition.

In some cases, a fire may occur after stopping because there is no longer any cooling effect from air flow during travelling. It has been reported that a tyre fire started after the vehicle had been parked for an hour.

2. What to do in case of an overheating or burning tyre ?

A major hazard of an overheated tyre is the risk of bursting without warning. If there is still air pressure in the tyre this can lead to a dangerous blast effect and possible projection of pieces of the tyre, or even the wheel, which may result in serious injury.

A tyre, which was thought to be extinguished, can easily re-ignite, particularly if the source of heat is still present (e.g. an overheated brake drum or hub).

The use of dry powder extinguishers may be ineffective as it does not provide an adequate source of cooling. Consequently, the risk of bursting should be considered before using a fire extinguisher.

Because of the above, the first action should always be immediately to call the fire service, who can spray down the tyre, wheel and surrounding area with fire hose(s) until all the heated parts have been completely cooled.

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Case 2 ASPHYXIATION AT A PROCESS PLANT

What happened

An asphyxiation incident occurred during a cleaning job at a chemical process plant.

Two workers were cleaning out an absorber tower that had been purged with nitrogen. They were using breathing apparatus sets equipped with voice communication link to a 'buddy' stationed outside. The breathing air was taken from a cylinder pack (pallet) outside the absorber tower.

Communication was lost with the two workers soon after work started. They were found unconscious inside.

One of them died from asphyxiation and the other was seriously ill.



Root Causes of fatality

Investigation later found that the air in the cylinders was contaminated.

Although an air compressor was used to fill the cylinders, there was remnant argon in the cylinder pack which resulted in an insufficient level of oxygen in the final compressed product. The contents were found to consist of oxygen (15%), argon (25%) nitrogen and helium.

The cylinder pack was converted from an argon-helium mixture service. The conversion procedure was not proper as evident from the gas analysis performed during the investigation.

Things that had gone wrong that resulted in the incident:

- There was no proper change of service conversion procedure for the cylinder pack.
- Apparently no quality check was done on the cylinder pack after filling or there was an error in the analysis due to the fact that the cylinders were not individually tested.
- No check was done at site to ensure that the breathing air was safe.



Key lessons

Filling of breathing air should be carried out only in proper filling facility with strict quality assurance.

Such facility should be segregated from industrial gas cylinder filling area. Moreover, cylinders used for breathing air should be in the dedicated service at all times.

Other important points to note:

Conversion to breathing air service shall only be done in accordance to prescribed standards. Refer to ISO 11621:1997 – Procedure for change of gas services.

Individual cylinders will need to be certified for use after the conversion.

- For the filling process, pre-fill purge shall be carried out and post fill quality check of cylinders shall be done (batch testing or individual testing, depending on the filling process). Testing equipment shall be in proper working condition.
- Proper record keeping and traceability of the filling shall be maintained.
- In addition, if the air is produced from a mixture of oxygen and nitrogen (cryogenic), it is imperative that individual cylinders are tested after filling.



Case 3 CRYOGENIC TANKER ROLLOVER FATALITY

What happened

At approximately 7.45 am a cryogenic tanker transporting liquid nitrogen rolled over. The vehicle was travelling at about 40 km/hr on a downward slopping stretch of road when it failed to safely negotiate a left hand curve in the road.

The rollover resulted in a fatal injury to the driver and a serious injury to the co-driver.



Approach direction of road







Truck rolled over and landed on the road

Drive side cabin crushed by the boulders





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Root causes of rollover and fatality

- Investigation revealed:
 - All truck systems were functioning properly
 - Driver was wearing his seat belt
 - Driver was not using his cell phone
 - Co-driver was in the sleeper berth (bunk) at the time of the incident
- Primary cause of the accident was driver fatigue or distraction/inattention.

Lessons learned

• It is important to plan and monitor the schedules of the drivers to ensure that they have adequate rest.



<u>Case 4</u> DISSOLVED ACETYLENE REGULATOR FIRE

What happened

While doing flame cutting using a Oxy-DA torch in a workshop, the user found that the flame kept on going off by itself. He then stopped his work and tried to identify the problem.

The user claimed that he had shut off the regulator and cylinder valve and then used a spanner to dismantle the regulator. His hand was holding the regulator in position. At this point, acetylene gas gushed out from the cylinder and ignited.

The fire then spread to the other parts of the workshop. He grabbed a nearby fire extinguisher to put out the fire. After the fire was put off, the Fire Brigade was called to help remove the cylinder..

The injured person was taken to a clinic and subsequently sent to hospital. He sustained first degree burn on his face, neck and hand.



Damages from the fire





Burns suffered by injured person

Workshop damage



Root causes

- Failure to follow safe working practice for acetylene gas.
 It was possible that spark from a nearby standing fan had ignited the leaked gas, thus causing injury to the person.
- Failure of the person to ensure both valves (cylinder & regulator) were closed by checking at the regulator gauge before dismantling the regulator.

Lessons learned

- It is important to follow safe working procedure for Oxy-DA cutting/welding to avoid accident.
- More safety information should be made available for the gas distributors and end users.

