SAFETY ALERT

cpi confederation of paper industries

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Fatality at French Paper Mill

Background

It has been reported that on 19 January, a contract pipefitter while working on top of a tank of pulp was fatally injured following an explosion. The incident happened at Nogentais Emin Leydier paper mill in France. The deceased was 47 years old.

Unconfirmed details (French to English translation)

Investigations are still ongoing, but early reports indicate that two pipefitters, who worked for an external company, were working 15-30 metres high on the roof of a tower of paper pulp (recycled) to change the outside pipes. Gases can form on the surface of pulp and the tower was fitted with a top vent to vent any 'gas' A technical shut was planned and other openings were performed the day before. The pulp was a little higher than usual, so the gas may have been closer to the top of the tower. The area was not considered ATEX (explosive atmosphere), as it is believed that the gases grow on the surface in principle, not explosive.

At 8.30hrs, an explosion rips off the top of the building. The fitter is then projected some fifteen feet below to the roof of a shed at the foot of the tower. The victim was found at 4-5 m above the ground. To get the victim back on dry land and off the roof, specialist rescue equipment was required. He died five hours later in hospital.

The top of the building affected was gutted and deformed by the blast. Under normal conditions pulp is stored before it is sent to the paper machine to form the sheet, and the damage has forced the plant to stop production until a technical solution to work without the tower is found.

Initial Analysis

The initial analysis is directed towards the heavy gas remaining on the surface of the pulp with a spark through the vent. (**The main hypothesis is explosive gas into tank due to anaerobic bacteria)**. When one of the two boilermakers attached a pipe to the grinder, there was a loud explosion inside the tower and the roof was raised on one side. The worker who was on this side was thrown over the guardrail and fell 15 feet below.

All experts consulted after the event (CRAM DREAL, etc...) do not understand how this could happen and all speak of an isolated and exceptional event. The companies insurance advises that this will result in heavy consequences for all paper mills in terms of procedures, but also investment (motors, pumps, drives, tours and waterproof connectors).

CPI Comment

Contrary to the above, this is not the first time that an explosion of this nature has occurred in the paper industry. **On July 29, 2008,** three workers were killed in an explosion at the **Packaging Corporation of America** (PCA) fibreboard manufacturing facility while they were welding on a temporary metal clamp to stabilize a damaged flange connection. The flange was located on top of an 80-foot tall storage tank that contained recycled water and fibre waste.

Site personnel were unaware of the potential presence of flammable gas from the decomposition of the organic material in the tank, and combustible gas monitoring was not typically required or performed prior to starting work. At the time of the accident, three workers were on a catwalk above the tank; one began welding the flange into place when sparks from the welding ignited flammable vapours inside the tank. Analysis of the tank contents determined that anaerobic bacteria had multiplied inside the tank and water recycle system over time, feeding on organic waste material. The bacteria likely produced hydrogen, a highly flammable gas, which ignited during the welding work.

Source: CSB website - Views of the storage tank involved in the 2008 explosion at Packaging Corporation of America.

U S Chemical Safety Board Recommendations

Following CSB investigation into a number of similar accidents; seven key lessons were found to be applicable to all or most of the incidents, all of which are applicable to paper companies working within the UK:

- **Use Alternatives** – Whenever possible, avoid hot work and consider alternative methods e.g. cold or hydraulic cutting
- **Identify the Hazards** – Prior to the initiation of hot work, perform a task related risk assessment that identifies the scope of the work, potential hazards, and methods of hazard control.
- **Monitor the Atmosphere** – Conduct effective gas monitoring in the work area using a properly calibrated combustible gas detector prior to and during hot work activities, even in areas where a flammable atmosphere is not anticipated.
- **Test the Area** – In work areas where flammable liquids and gases are stored or handled, drain and/or purge all equipment and piping before hot work is conducted. When welding on or in the vicinity of storage tanks and other containers, properly test and if necessary continuously monitor all surrounding tanks or adjacent spaces (not just the tank or container being worked on) for the presence of flammables and eliminate potential sources of flammables.

- **Use Written Permits** – Ensure that qualified personnel familiar with the specific site hazards review and authorize all hot work and issue permits specifically identifying the work to be conducted and the required precautions.
- **Train Thoroughly** – Train personnel on hot work policies/procedures, proper use and calibration of combustible gas detectors, safety equipment, and job specific hazards and controls in a language understood by the workforce
- **Supervise Contractors** – Provide safety supervision for outside contractors conducting hot work. Inform contractors about site-specific hazards including the presence of flammable materials.

Additional Information

Hydrogen sulphide

Hydrogen and hydrogen sulphide (both flammable gases) result from an aerobic bacterial action on paper fibre or organic material. The necessary growth conditions are undisturbed organic material in a warm aqueous system at a near-neutral or slightly alkaline pH. These conditions are likely to occur during mill shuts where the above conditions apply. Note: If hydrogen formulation occurs in stagnant conditions, it may remain attached to paper fibres until agitation is recommenced; hydrogen could then be released into the air.

Control Measures

- At the start of mill shuts or other sustained breaks in production (over a weekend); it is preferably to empty and thoroughly clean all chests and white water storage.

If there is provision for agitation of stock, the following options may be considered if there are exceptional reasons to do so:

- continue agitation to prevent aerobic conditions and maintain an adequate level of biocide; or
- add sufficient biocide, agitate fully and allow to stand. Consult the biocide supplier to determine how much and how often biocide should be added to give adequate protection;
- in either case, ensure that the chest or tank is adequately ventilated, so that any traces of flammable gases are dissipated;
- in addition, carry out tests to confirm the absence of hydrogen and hydrogen sulphide before hot work is permitted nearby or on the chests etc, or if there are any ignition sources in the locality;
- tanks should be cleaned regularly. Even if there is ample agitation of stock, debris can remain undisturbed, allowing bacteria to breed;
- for any entry to chests and tanks, a confined-space permit-to-work must be issued.

Note that hydrogen sulphide can also be generated in effluent plants and appropriate precautions should be taken to prevent risk.

Further Information and references

Dangerous substances and explosive atmospheres regulations 2002
http://www.hse.gov.uk/pubns/priced/l138.pdf

Fire and Explosion: How safe is your workplace http://www.hse.gov.uk/pubns/indg370.pdf

Paper Mills: PABIAC Guidance on fire risk http://www.hse.gov.uk/pubns/web08.pdf

CSB Website and video room - http://www.csb.gov/videoroom/detail.aspx?VID=44