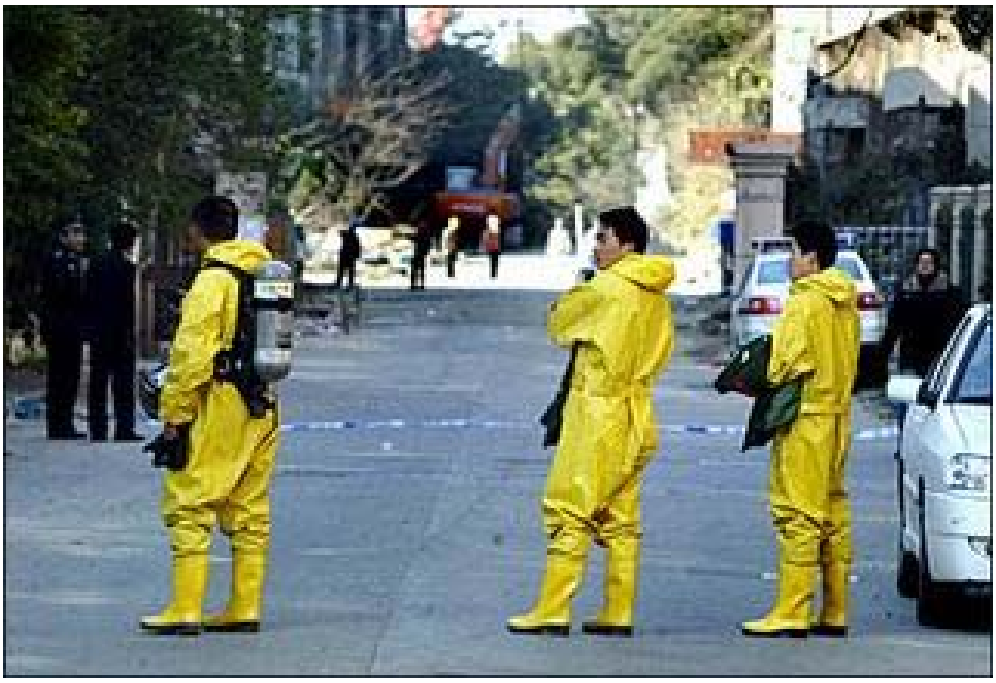
Global Safety Team (GST) Newsletter

World Chlorine Council

Home Page: http://worldchlorine.com/



Emergency Responders after Securing Chlorine Leak in Shanghai (see page 4)

May 2007

Volume 2

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Contents

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This Newsletter is the second in what is expected to be a series of quarterly newsletters issued by the World Chlorine Council's Global Safety Team. This newsletter is being distributed by your regional association to its members in a manner that it chooses. Feedback by anyone reading this newsletter is welcomed. Feedback should be sent to your association's GST contact as listed below.

The World Chlorine Council's Global Safety Team is comprised of 24 members from eight trade associations and nine companies who are members of one or more of these trade associations.

WCC Global Safety Team Association Contacts

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News about the Global Safety Team

Global Safety Team (GST) Incident Tracking Program

The GST seeks to learn about any chlorine incident and report about it in this newsletter or in its annual compilation of such incidents so all can learn about such incidents with the goal of preventing reoccurrence. The GST believes it is important to use the experience so gained to improve the technical recommendations published by the members associations. Please report any such chlorine incident to your member association per the contact list on page 2 of this newsletter.

GST Ambassador Program

The ambassador program is an outreach program to new and not so new producers, users, or distributors of chlorine to provide them with safety and stewardship information pertaining to chlorine and to industry contacts primarily in countries where there is no active WCC association. Ambassador packets are available from your local association contact or the secretariat of the GST per the contact list on page 2 of this newsletter.

January Edition - GST Newsletter

- The initial edition of the Global Safety Team Newsletter was distributed by the various association members to their own organization members. In addition, Clorosur translated it into Spanish to be more useful to several of its members and to Latin American members of the Chlorine Institute.
- The Japan Soda Industry Alliance translated it into Japanese prior to distribution to its members.
- RusChlor translated it into Russian, put the text on RusChlor's web-site, and urged its Russian members to take a notice of it.
- On behalf of WCC, The Dow Chemical Company translated it into Chinese (Mandarin) for subsequent distribution to Chinese affiliates and associations.

Useful Links:

Center for Chemical Process Safety (CCPS) http://www.aiche.org/ccps/

CCPS has a variety of information on process safety. Some of the information is available for free downloads. CCPS issues its monthly Process Safety Beacon in a variety of languages and distributes it for free. These one page articles are great to use for tool box safety meetings. You can sign up for a free subscription at http://www.aiche.org/CCPS/Publications/Beacon/index.aspx.

Chemical Safety Board http://www.csb.gov/

The US Chemical Safety and accident Safety Board investigates accidents that have occurred in chemical plants in the United States. Archives of completed investigations provide details of what went wrong.

OSHA Reactives Chemicals Technical Information

The US Occupational Safety and Health Administration maintains a website devoted to reactive chemicals at http://www.osha.gov/dcsp/alliances/reactives/reactives.html.

EU Safety and Health **http://osha.europa.eu/OSHA**

This European Agency is focused on helping the European industry in the field of occupational safety and health, with good practices information, practical examples…
A specific site is dedicated to the 19 millions Small and Medium-size Enterprises at *http://sme.osha.europa.eu/*

EU Prevention, Preparedness and Response to major accidents in the chemical industry
http://ec.europa.eu/environment/seveso/index.htm

Although it is located in the "Environment" part of the EU website, this specific part refers to the application of the EU Directive to prevent and organize the response on major chemical accidents in the industry.

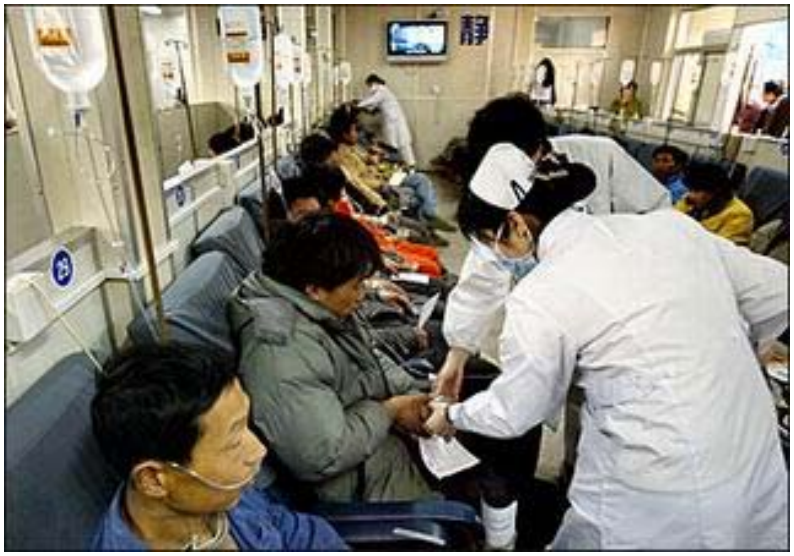
Learning from Incidents

1. Chlorine leak Injures 59 workers in Shanghai

(Source: Xinhua News Agency 03-13-2007)

Description of Incident:

The Xinhua news agency reported on a chlorine release from a Shanghai chemical plant in March. Details of the incident are sketchy. It was reported that a chlorine release occurred on March 12 injuring 59 workers as they were tearing down an abandoned chemical plant at a dock along the Huangpu River. The local government reported that the workers were dismantling a solvent plant when they were sickened by a spill of remnant chlorine from some old equipment. Fire fighters and workplace safety personnel capped the leak shortly after the accident was reported at 7:00 AM, and all the workers were hospitalized. According to a hospital spokesperson, eight workers were seriously poisoned and were under intensive care for a period of time. Follow up reports were sketchy, but it is believed that all the workers have recovered.



Workers being treated in Shanghai hospital.

Lessons Learned:

Abandoned chorine process lines, equipment, and plants need to be decontaminated at the time of the abandonment. If possible they should be removed at the same time. If not possible, consideration should be given to having the pipes/equipment left open to atmosphere. If the process line or equipment is simply sealed off (e.g., with the use of a blank flanges), no one knows for certain what the status of the equipment is prior to opening. Valves, that are opened, may be plugged giving a false indication that the equipment is empty. When tackling such equipment, workers should assume that the equipment may contain hazardous materials and wear appropriate personal protective equipment (PPE). Only necessary workers wearing appropriate PPE should be in the area potentially affected by a release caused by a contaminated piece of equipment.

2. Wet chlorine can become too dry!

Process description

During start-up, shut down or for emergency purpose, the production of a chlor-alkali cell room can be connected directly to the chlorine absorption unit (tail gas scrubber) via a plastic fiberglass reinforced pipeline. This may be done for an initial period of time until the chlorine concentration is sufficiently high to allow it to go thru the compression and liquefaction sections. A titanium butterfly valve is used to open or close the flow. Normally, the chlorine is hot and saturated with water vapour.

Description of Incident:

During a period of normal production, while no chlorine was transferred to the absorption unit, the plastic pipeline caught fire in the area just upstream the titanium valve.

As soon as the fire was detected, the operators activated the fire alarm and the electrolysis was immediately shut down. Most of the chlorine gas inventory of the cells and the pipeline could be fed to the absorption unit.

The firefighters rapidly stopped the fire and applied water curtains to control the small amount of emissions coming out from other chlorine sources connected to the pipeline (estimation of < 10 kg for about 10 minutes).

Lessons Learned:

After analysis, it appeared that the incident was likely caused by a chlorine fire of the titanium of the butterfly valve. Due to quite cold weather, the temperature of the chlorine in the pipeline cooled down progressively and even came below 10 °C near the valve; chlorine hydrates were found there, confirming this hypothesis.

The water content of the chlorine gas condensed and the remaining humidity of the gas became too low to protect the titanium that caught fire in this too dry chlorine, destroying the plastic pipeline.

To avoid the potential risk of a repetition of this event, the titanium butterfly valve was replaced by another one lined with PTFE, and the new valve was relocated closer to the cell room (warmer area).

3. Chlorine Release During Railcar Inspection

Description of Incident:

Approximately 50 pounds of chlorine were released from a railcar undergoing routine inspection. The incident occurred when water, during normal cleaning operations, was introduced into a car that unknowingly still contained liquid chlorine. The operators involved in this task connected both liquid valves on the railcar and one vent valve to a scrubber. After vacuum was reached on the car, they did not detect any evidence of chlorine liquid remaining in the car. The operators began to add water to purge all chlorine gas in the car and prepare it for entry. However, chlorine liquid still resided in the car. As a result, the car became pressurized, and chlorine and chlorinated water began leaking out at a hose fitting. The incident where this occurred is identified as Company F

Discussion of Industry Practices:

Because this maintenance activity is commonly performed, a group of producers met and shared their practices for preparing a chlorine railcar for inspection and maintenance.

The summary of the discussion is presented below:

Company A Procedure

a) Vent pressure
b) Pull vacuum (20 inches of mercury)
c) Check car for frost
d) Hold vacuum for 1 hour. Check vacuum through liquid line
e) If no loss of vacuum purge with dry air for 1 hour
f) Pull vacuum to 20 inches mercury
g) Repeat 1 hour test
h) Disconnect
i) Move to tank test location
j) Connect water if vacuum is held
k) Fill with water and vent to chemical sewer

Company B Procedure

a) Blow down less than 5 lbs. to atmospheric scrubber
b) Pull 3 inch water vacuum
c) Isolate car
d) Hold vacuum for a minimum of 4 hours
e) Crack valve to verify continued vacuum
f) Repeat if vacuum does not hold.
g) Purge car with dry air through vapor valve out the liquid line for 1 hour. The air vents thru a series of 3 knockout pots which are equipped with temperature sensors and level indicators. Following the knockout pots, the vents discharge to the atmospheric scrubber. It is important to note, due to the density of the chlorine, this company injects air through the vapor valve and vents through the liquid valve as they believe it better clears the contents out of the car
h) Fill with water at 200-215 psi
i) Company uses Chicago Couplings with straight through nipple

Company C Procedure

a) Blow down 5-10 psi dry air
b) Pull 10-15 inches of mercury vacuum

c) Repeat twice
d) Pull vapor valve and check car for liquid with light
e) If found repeat steps a through d
f) Vacuum is held for no set length of time
g) When no liquid fill with water and vent to 25% caustic car

Company D Procedure

a) Very similar to Company C procedure.
b) Vacuum of 10 inches of mercury is used.

Company E Procedure

a) Very similar to Company A's procedure with the exception that they do not sweep air through the car.
b) Looks for signs of frosting
c) Uses a vacuum gauge
d) Uses hammerlock instead of Chicago fittings
e) Add separate line of 12% caustic while filling the car in addition to the water. This company believes that by adding the caustic solution, it gives the car a neutral solution when the car is emptied.
f) Uses 25% caustic in the venting process.
g) Vacuum is to 20 inches of mercury
h) Water is introduced through the liquid line at a pressure of 60-70 psi.
i) Total caustic introduced is about 20 gallons per car

Procedure Variations

It was noted that each company is using similar procedures with a few significant variations. These significant variations include:

a) Some take a physical look and some do not to verify that no liquid chlorine is present.
b) The use of caustic while filling with water is unique to Company E.
c) Less significant were the differing vacuum levels.

Best Practice

No clear best practice was evident from the discussions.

a) There was discussion of monitoring and some variations were found, such as:

i. Companies B, C, E, and F always have an operator in attendance. While Companies A and D utilize cameras and chlorine monitors.

ii. Companies B and D always weigh the chlorine cars, while Companies A, C, and F only weigh for cause.

It was agreed that no consensus procedure was needed but that the incident and findings should be communicated to the membership.

Note - Euro Chlor has published a recommendations on this subject (*GEST 79/78 - Code of Good Practice for the Operations to be Carried out before and after Maintenance on Road and Rail Tankers and ISO-Containers of Liquid Chlorine*).

Six more tips contained in the GST's Always- Never Poster

Always

- Clean piping and equipment in sodium hydroxide services, and acidize metal surfaces prior to welding, cutting, or performing other forms of heat treatment!
- Add sodium hydroxide TO water when mixing both components!
- Consider cooling systems when sodium hydroxide and water are mixed!

Never

- Never operate a chlorine system with carbon steel equipment above 300 °F (150 °C)!
- Never allow chlorine to come into contact with organic oils and greases!
- Never allow a hydrogen system to operate above oxygen limits defined for your facility's process!

The full poster can be downloaded from the WCC website at http://worldchlorine.com/programs/safety_tips.pdf .

From the Dilbert archives: