Lessons Learned from Chemical Accidents in China

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The CPI in China

The chemical process industry (CPI) in China has been the pillar industry
- By the end of 2013, China boasted 28,652 petrochemical businesses
- Gross industrial output value US $2.1 trillion

The CPI has presented a significant safety risk to human lives and the environment.
- Fire, Explosion, Toxic gas
- Damage to environment
Statistics of Chemical Accidents in China

Fatalities vs. Number of Accidents from 2004 to 2012.
Lessons Learning

• Lesson learning – a core value in the Chinese philosophy.
  Confucius ever said “In a group of three people, there is always something I can learn from”.

• We need to learn lessons from chemical accidents.
  ➢ We can learn what happened, what went wrong, and why it happened
  ➢ Lessons learned can help to prevent the occurrence of similar accidents

• Lessons learned are useful for:
  ➢ Government agency: what happened, what went wrong, why it happened
  ➢ Company: what happened, what went wrong, why it happened, and what is the solution
  ➢ Public: what happened, what to do in emergency rescue

• Accident reporting and publication of the reports are two major steps to learning from accidents.
Accident Reporting System in China

Relevant agencies include:
- Public Security
- Labor Security
- Workers Union
- People’s Procuratorate

Level I or II

< 2 hrs

SAWS

< 2 hrs

Provincial WSB

< 2 hrs

City WSB

< 2 hrs

County WSB

Provincial Gov. & Relevant Agencies

Municipal Gov. & Relevant Agencies

County Gov. & Relevant Agencies

The State Council

MEP

Provincial EPB

City EPB

County EPB

< 1 hr for Level I & II

< 4 hrs for Level III & IV

< 2 hrs for Level I & II

< 4 hrs for Level III & IV

< 2 hrs for Level I & II

< 2 hrs for Level I & II

In case of emergency

Responsible Person on site

Other Reporting Persons
Publication of Chemical Accidents

Information regarding chemical accidents in China are collected and stored mainly by two departments: State Administration of Work Safety (SAWS) and Ministry of Environmental Protection (MEP).

• Three chemical safety-related databases of SAWS. Access is open to the public without a password.
  – Accident Inquiry System (AIS)
  – Chemical Accident Case Base (CACB)
  – Daily Accident Information (DAI)

• The environmental accidents database of MEP

• The accidents database of a safety culture website
Accident Inquiry System (AIS)

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<th>Date</th>
<th>Death toll</th>
<th>Incident Description</th>
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<tr>
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<tr>
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<tr>
<td>2013-03-25</td>
<td>5</td>
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</tr>
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</table>

**Start time**

**End time**

**Death toll**

**Keywords**
Chemical Accident Case Base (CACB)
Daily Accident Information (DAI)

- Anhui City refinery gas leak, 37 people admitted to hospital, April 6, 2010
- Guangxi — 20-ton tank truck ammonia leak, 200 people evacuated, April 6, 2010
- Hunan Xiangtan County liquefied gas station explosion, 10 people injured, April 6, 2010
- Inner Mongolia chemical plant explosion, 2 dead, April 4, 2010
- Hebei Hebei 30-ton sulfuric acid leak, threatens primary school, March 30, 2010
- Gansu Qinghai company explosion, 3 people died, April 25, 2010
- Gansu Qinghai company explosion, 4 people died, April 25, 2010
- Gansu Qinghai company explosion, 3 people injured, April 24, 2010
- Foshan factory “dangerous chemicals” leak, 100 people evacuated, April 20, 2010
- Hubei Yangtze new chemical plant explosion, 1 dead, April 9, 2010
The Safety Culture Website

Breaking news picture

Breaking news on accidents

Real time accident news
Lessons Learned

The lessons learned from some reported major chemical accidents in China have resulted in the quick development of legislation and standardization to prevent future similar accidents.

• The natural gas well blowout accident in Chongqing, China in 2003
  A new standard released in 2008

• A petrochemical plant exploded in Jilin Province, China in 2005
Case Study – Natural Gas Blowout Accident

The natural gas well blowout accident occurred in Chongqing, China in 2003

- 243 deaths
- 2,142 hospitalizations
- 65,000 evacuations
Case Study – Natural Gas Blowout Accident

Direct causes
- The duration of mud circulation is insufficient
- Discharge pressure relief valve against rules
- Fail to ignition in time

Indirect causes
- Unimplemented responsibility in safe production
- Imperfections in engineering design
- Imperfections in emergency response plan
Case Study – Natural Gas Blowout Accident

Lessons Learned

• The job must be carried out in strict accordance with standard operation procedures.
• Meter reading person should pay attention to whether the temperature and pressure are normal.
• Safety is first when there is conflict between economic benefits and safety.
• The interactions between company and surrounding should be considered in the engineering design.
• Company should report the chemical accident to relevant authorities in time.
• Relevant authorities should strengthen the supervision and improve the ability of emergency response.
• The public should participate in the chemical accidents emergency training and education.
Case Study – Natural Gas Blowout Accident

A new standard released in 2008

Specification for ignition time of out of control on wellhead of natural gas well involving hydrogen sulfide.

An out of control natural gas from a well has to be ignited within 15 minutes after a blowout if there is any resident not evacuated 500 meters away from the well.
Lessons Learned Share among Organizations

• It is important to share lessons learned from chemical accidents among different countries and international organizations.
• In developing countries, the safety situations of chemical industry are still severe. The sharing of lessons learned among different countries and organizations can improve chemical accident prevention and mitigation of potential consequence.
• Organizations should include: international organizations, government agencies, industry associations, research institute, enterprise etc.
• The idea of “Open to the Public” has been gradually accepted by the industry and the government. All stakeholders should have access to accident reports.

There will be Chinese cases included in the eMars system that can be searched by European countries as well.
Study on Chemical Accident Reporting in China

• This is a collaboration project between UNEP, MAHB and Tsinghua University (support of Renmin University).

• The publication is a first result of identifying the situation in China as well as a first project to share accident reports between MAHB and MEP (China).

• The project resulted also in some recommendations for how an accident report should look like.

• The project will continue to sharing case studies of chemical accidents.

For more information, please see the UNEP website: www.capp.eecentre.org
Recommendations

• A better chemical accident reporting and information sharing system has to be developed and deployed to achieve timely and accurate reporting of accidents, as well as updated accident investigation and emergency response procedures.

• Full accident reports should be published in a dedicated website that is accessible for the public. The information of what happened and emergency rescue is useful for them. From these accident reports, the public can learn how to evacuate in the emergency rescue.

• A key word searching function should be available in the accident report website. Other than literal search, semantic search should also be a preferred feature.

• Recommendations on protection measures for emergency responders should be given in the accident reports.
Conclusions

• Most of chemical accidents are not well-known and well-published in China.

• Accident reporting and publication of the reports are two major steps to learn from chemical accidents.

• The lessons learned from some reported major chemical accidents in China have resulted in the quick development of legislation and standardization to prevent future similar accidents.

• It is important to share lessons learned among different countries and international organizations.
Acknowledgements

• United Nations Environment Programme (UNEP)

• Major Accident Hazards Bureau (MAHB)

• Ministry of Environmental Protection (MEP)
Thank you very much!