



Chemical Safety and Security Overview

Indonesia
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Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC05-04OR21400.





Why practice chemical safety?

- ▶ Health and safety of the workers
- ▶ Prevent accidental releases
 - Potential regulatory fines, lawsuits
- ▶ Relationship with the local community
- ▶ Ensure a sustainable environment



Industrial Safety Incidents

Catastrophic process incidents:

- ▶ 1976 Seveso Italy
- ▶ 1984 Bhopal India
- ▶ 2005 Texas City Texas

More recently:

- ▶ 2009-Fertilizer tank collapses
 - 2 critically injured
 - Responders exposed to ammonia
 - 760cm³ released
 - River contaminated
- ▶ 2007-Fire and Explosion
 - Filling ethyl acetate storage tank
 - Equipment not bonded and grounded



Photo credit: U.S. Chemical Safety Board.
<http://www.csb.gov>



U. S Chemical Safety Board Video



CSB Video – Reactive Hazards 20 minutes
Reactive_clipped.mpg

Center for Chemical Process Safety



- ▶ Anyone can subscribe
- ▶ Delivers monthly process safety messages to plant operators and other manufacturing personnel.
- ▶ Presents a real-life accidents, lessons learned, and practical means to prevent accidents at your plant.
- ▶ Published in 29 languages, including Malay
 - <http://www.aiche.org/CCPS/Publications/Beacon/index.aspx>




Adakah anda bersedia untuk bencana alam?




Regulations and Standards



- ▶ Individual country regulations
 - EU REACH
 - U.S. OSHA Process Safety Standard
- ▶ International chemical & labor organizations
 - ICCA Responsible Care
 - International Labor Organization
- ▶ International standards
 - ISO 14001:2004
 - OHSAS 18001
 - United Nations-GHS
 - SAICM





International Organization for Standardization




What about chemical security?



- ▶ Chemical theft
 - Precursors for drugs
 - Precursors for chemical weapons
 - Dual-use chemicals
 - Industrial chemicals
 - Flammable/toxic gases
 - Ammonium nitrate
 - Chlorine
 - Pesticides
- ▶ Plant sabotage
 - Deaths, injuries
 - Economic and environmental impact



Abandoned Bhopal Plant
Photo credit: AP/Saurabh Das




What are the threats to chemical security?



- ▶ Unlimited access to facilities
 - Chemical storage areas
 - Analytical laboratories
 - Waste storage
 - Construction sites
- ▶ No controls or security checks on chemical procurement
- ▶ Shipping and receiving areas not protected
- ▶ Recruit young chemists
 - Tokyo subway Sarin attack






Threats to Cyber Security

- SCADA control software is used by one-third of industrial plants
- Security technology may not work on plant proprietary networks
- Attacks may result in:
 - Loss of process control
 - Loss of production
 - Process safety incidents
- Examples:
 - Insertion of Trojan program into SCADA causes explosion on Trans-Siberian pipeline
 - 2005-Zolob worm shuts down 13 Daimler Chrysler Plants



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International Resolutions & Organizations Related to Chemical Security

- UN Security Council Resolution 1540
- Australia Group
- Organization for the Prohibition of Chemical Weapons
- American Chemistry Council
 - *Responsible Care Security Code*



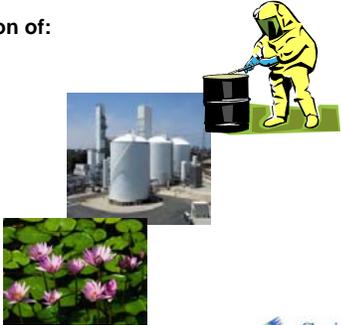
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How are chemical safety and chemical security related?

Both Ensure Protection of:

- ▶ Workers
- ▶ Plant facilities
- ▶ Plant processes
- ▶ Community
- ▶ Environment
- ▶ Economy



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Reflect and Consider

What chemical safety and security practices and controls does your plant require?

...Are they **effective**?

...Could they be **improved**?

...How?

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