SAND2007-0934C

Chemical Weapons

Terminology, Technology, Treaties and Verification Techniques

March, 2007

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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-AC04-94AL85000.
SAND 2007-xxxxx

What is a chemical weapon?

- Uses the toxic properties of chemical substances to kill, injure or incapacitate an enemy
  - Does not rely on explosive force
  - Includes toxic compounds produced by living organisms
- Many common industrial chemicals are classified as precursors

Terminology

- Chemical warfare
- Chemical weapon
- Chemical weapon agent
- Characteristic properties
  - Density (specific gravity)
  - Volatility vs persistance (vapor pressure, droplet size)
  - Lethality vs incapacitation (safety factor, LD_{50})

Agents

- Asphixiant/Blood (hydrogen cyanide)
- Choking/Pulmonary (chlorine)
- Cytotoxic (ricin)
- Incapacitating (Agent 15)
- Lachrymatory (CN)
- Nerve (Sarin)
- Vesicant/Blister (mustard)

Technology

	Agents	*Dissemination*	*Protection*	*Detection*
1900s	Chlorine Chloropicrin Phosgene Mustard gas	Wind dispersal		Smell
1910s	Lewisite	Chemical shells	Gas mask Rosin oil clothing	
1920s		Projectiles w/ central bursters	CC-2 clothing	
1930s	G-series nerve agents	Aircraft bombs		Blister agent detectors Color change paper
1940s		Missile warheads Spray tanks	Protective ointment (mustard) Collective protection Gas mask w/ Whetlerite	
1950s				
1960s	V-series nerve agents	Aerodynamic	Gas mask w/ water supply	Nerve gas alarm
1970s				
1980s		Binary munitions	Improved gas masks (protection, fit, comfort)	Laser detection
1990s	Novichok nerve agents			

Detection Technologies

- Enzymatic detection
- Chemical detection paper
- Colorimetric tubes
- Ion mobility spectroscopy (IMS)
- Infrared radiation (IR)
- Photo-ionization detection
- Flame photometry
- Miniature automatic continuous agent monitoring system (MINICAMS)
- Surface acoustic wave (SAW) chemical detector

Treaties and Agreements

1675	Strasbourg Agreement—German gunners were reported in 1650 to have pledged to "not construct any poisoned globes" and to "never employ them for the ruin and destruction of men."
1874	The Brussels Declaration Concerning the Laws and Customs of War is signed, specifically forbidding the "employment of poison or poisoned weapons."
1900	The Hague Conference, which includes a declaration banning the "use of projectiles the object of which is the diffusion of asphyxiating or deleterious gases," enters into force.
1922	After World War I, the Washington Arms Conference Treaty prohibited the use of asphyxiating, poisonous or other gases. It was signed by the United States, Britain, Japan, France, and Italy, but France objected to other provisions in the treaty and it never went into effect.
1929	The 1925 Geneva Protocol enters into force, prohibiting the use of poison gas and bacteriological methods of warfare. As of 2004, there are 132 signatory nations. US ratifies in 1975.
1991	President George H.W. Bush unilaterally commits the United States to destroying all chemical weapons and to renounce the right to chemical weapon retaliation.
1997	**The Chemical Weapons Convention (CWC) outlaws the production, storage, and use of chemical weapons.**

Chemical Weapons Convention

- Prohibits production, storage, transfer, and use of CW
- Classifies chemicals into three schedules
- Entered into force April 29, 1997
- “Carrot-and-stick” approach to arms control
- Administered by the Organization to Prohibit Chemical Weapons (OPCW)

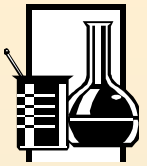
CWC Global Acceptance

OPCW

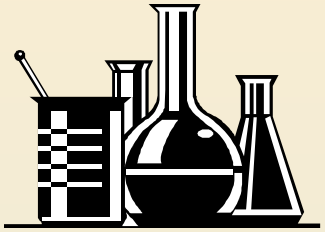
- Administers CWC
- Organization
  - Director-General (Rogelio Pfirter, Argentina)
  - Executive Council
  - Technical Secretariat
- Conducts on-site inspections
  - Initial baseline and on-going production inspection
  - CW destruction verification
  - Facility destruction verification
  - Challenge inspections
  - Alleged-use inspections

Chemical Schedules

- Schedule 1
  - Few uses outside warfare
  - Medical and research use in very small quantities



- Schedule 2
  - Legitimate small-scale use



- Schedule 3
  - Dual-use chemicals with large-scale industrial application
- Discrete organic compounds

CWC “Carrots”

- Training of national authorities
- Assistance with stockpile disposal
- Assistance with orphan munitions
- Industrial cooperation program
- Legal assistance
- CW protection expertise

CWC “Sticks”

- Global condemnation
- Chemical trade restrictions/prohibitions
- Challenge inspections
- Alleged-use inspections

On-site Inspections

- Used under a wide-variety of mandates
- 2,659 inspections carried out at 999 facilities
- Clearly defined modalities, goals, and responsibilities
- Minimizes chances for misunderstandings
- USG National Authority is Department of State but implementation is shared between:
  - DoD (DTRA)
  - DOT (BIS)

Challenge Inspections

- “Green light” by default
  - Requires 75% EC vote to deny a request
- No right of refusal, but see “Managed Access”
- Very short notice
  - >12 hours: Notification of an inspection
  - <24 hours: Identification of site; arrival at POE
  - <24 hours: Arrival at site
  - <84 hours: Duration of inspection
- Limited duration
- Rigorously scripted and formatted
- Inspectors report findings *not* conclusions to OPCW Executive Committee

Conflicting Inspection Rights and Obligations

Inspection Team

1. Collect information to determine compliance or non-compliance
   - Inspect
   - Sample
   - Photograph
   - Interview
   - Request clarification
2. Verify activities are consistent with declarations
3. Absence of Schedule 1
4. Non-diversion of Schedule 2 and 3
5. Minimize impact on inspected facility

Inspected State Party

1. Provide enough information to determine compliance
2. Demonstrate activities consistent with declarations
3. Protect unrelated sensitive information
   - Proprietary
   - National security
   - Export-controlled
   - Confidential
4. Facilitate inspection and escort inspectors

Managed Access

1. Removal of sensitive papers from office spaces;
2. Shrouding of sensitive displays, stores, and equipment;
3. Shrouding of sensitive pieces of equipment, such as computer or electronic systems;
4. Logging off of computer systems and turning off of data indicating devices;
5. Restriction of sample analysis to presence or absence of chemicals listed in Schedules 1, 2 and 3 or appropriate degradation products;
6. Using random selective access techniques whereby the inspectors are requested to select a given percentage or number of buildings of their choice to inspect; the same principle can apply to the interior and content of sensitive buildings;
7. In exceptional cases, giving only individual inspectors access to certain parts of the inspection site.

Questions and Discussion