

CBRN Weapons

Basic concepts

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The Trench

Export Control and CBRN Challenges

Training The Trainers Workshop – Lecture 1

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Part 1

THE WEAPON SPECTRUM

C – B – R – N

Chemical weapons

Biological weapons

Radiological weapons

Nuclear weapons

1950s – 1960s:
CBR a distinct category

‘WMD’ has no internationally accepted legal definition

- Each weapon category falls under a different (type of) legal regime
- The respective legal regimes determine the *formal scope* of the weapon category
 - *CW* and *BW* formally defined in treaties (CWC; BTWC)
 - *RW* and *NW* lack universally accepted legal definitions

Part 2

UNDERSTANDING THE SPECTRUM:
CHEMICAL WEAPONS

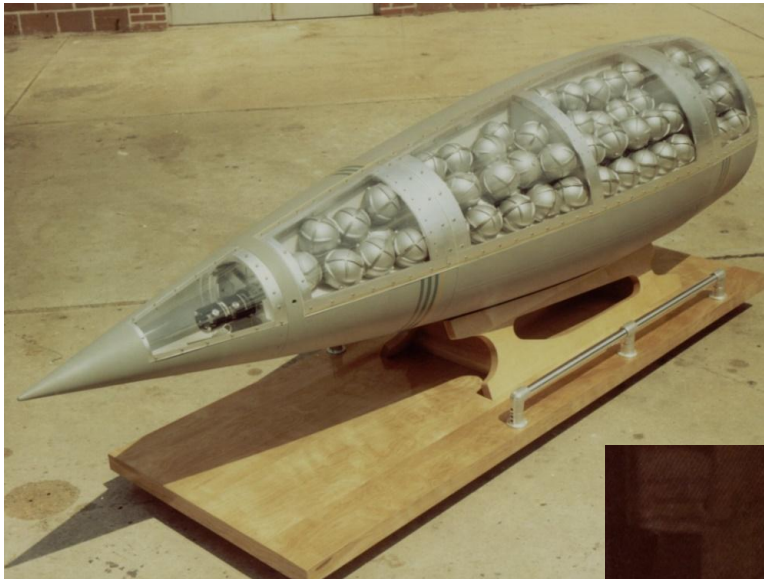
What is chemical warfare?

Intentional application for *hostile* purposes of *toxic* substances against humans, animals and their environment

- *Blood agents*: prevention of oxygen transfer to tissues (e.g. phosgene)
- *Choking agents*: interfere with breathing (e.g. chlorine)
- *Nerve agents*: attack the central nervous system (e.g. sarin)
- *Vesicants*: produce blisters (e.g. mustard agents)

- *Incapacitating agents*: induce temporary physical disability or mental disorientation (e.g. LSD, BZ, Fentanyl)
- *Irritating agents*: induce temporary irritation (e.g. tear gas)
- *Anti-plant agents*: herbicides, growth inhibitors, etc.

Images of chemical warfare



Understanding chemical weapons

- Ranges from irritants (e.g. lachrymatory agent) and incapacitants (e.g. BZ & fentanyl) to the most toxic nerve agents (e.g. sarin & VX) or toxins (e.g. ricin & saxitoxin)
- Core aspects of the CW definition in *Chemical Weapons Convention*:
 - Any toxic chemical which through its chemical action on life processes can cause death, temporary incapacitation or permanent harm to humans or animals
 - **Plants not mentioned!** (Does not mean that toxic antiplant agents are not CW)
 - Also covers precursors to such toxic chemicals
 - Delivery systems and specialised equipment
- CWC definition is based on the *General Purpose Criterion*
 - Covers past, present *and* future toxic substances
 - Does not distinguish methods of synthesis or whether an agent may be naturally occurring

Part 3

UNDERSTANDING THE SPECTRUM:
BIOLOGICAL WEAPONS

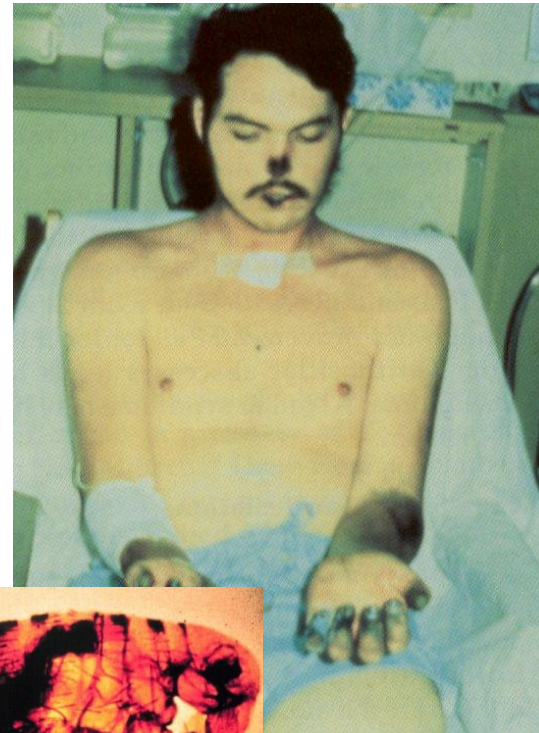
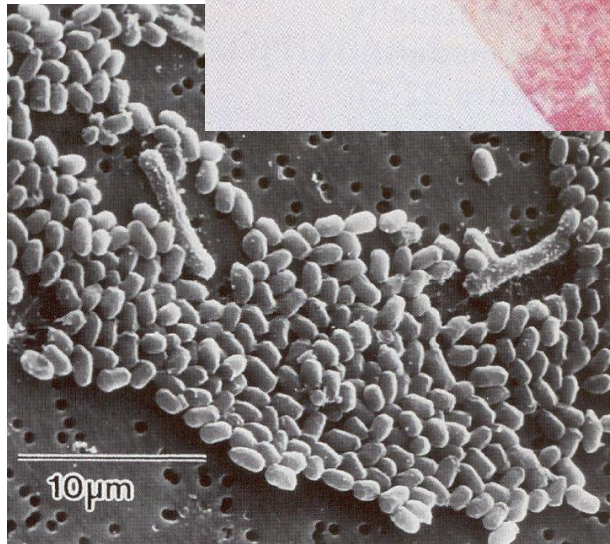
What is biological warfare?

Intentional application against humans, animals or plants for *hostile* purposes of

- *Disease-causing micro-organisms* (e.g. bacteria);
- *Other entities that can replicate themselves* (e.g. viruses, infectious nucleic acids and prions)
- *Toxins*, poisonous substances produced by living organisms (and their synthetically manufactured counterparts), including
 - micro-organisms (e.g. botulinum toxin),
 - plants (e.g. ricin derived from castor beans), and
 - animals (e.g. snake venom)

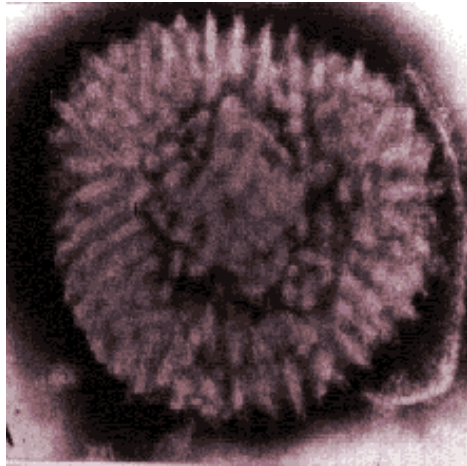
Visions of biological Warfare

Anthrax



Plague

Visions of Biological Warfare – 2



Smallpox

Understanding biological weapons

- Ranges from incapacitating agents (e.g. salmonella) to lethal ones (e.g. anthrax bacteria or smallpox virus) or toxins (= overlap with CWC)
- Core aspects of the BW definition in *Biological and Toxin Weapons Convention*:
 - Microbial or other biological agents, or toxins (human, animal and **plants**)
 - Weapons, equipment or means of delivery
 - Understanding evolves through common understandings reached at 5-yearly Review Conferences (e.g. inclusion of subcellular particles and bioactive molecules)
- BTWC definition is based on the *General Purpose Criterion*
 - Does not distinguish between origin or method of production
 - Covers any relevant development in synthetic biology, genetic engineering, etc.

Part 4

UNDERSTANDING THE SPECTRUM:
RADIOLOGICAL WEAPONS

What is radiological warfare?

Intentional exposure of living organisms to a radiation source or radioactive contamination of an area for hostile purposes

- *Radiological weaponry* (e.g. enhanced radiation weapon or neutron bomb, proposed by USA in late 1970s);
- *Deliberate targeting of people* (e.g. assassination)
- *Rendering areas inaccessible*, forcing major decontamination operations (e.g. economic warfare or terrain denial)
 - Highly radioactive sources would require major sanitation of area/infrastructure and possibly complete reconstruction of area
 - Possible dispersal by means of an explosive device (so-called 'dirty bomb')
 - Radioactive waste dispersal could also require major decontamination operations (if only to counter psychological impact)

Visions of radiological warfare



NEUTRON BOMB: AN EXPLOSIVE ISSUE

By Wayne Biddle

Four years ago, the United States triggered a controversy in Europe over its plans to build neutron bombs. In April 1978, Ronald Reagan, then a future Presidential candidate, stepped into the fray. He declared that the new bomb was "the first weapon that's come along in a long time that could easily and economically alter the balance of power. It could be the ideal deterrent." President Carter eventually set the plan aside, but last summer the Reagan Administration decided to go ahead with it. This move raised yet again the problem — and with it the heated, emotional controversy and debate — of how to defend Europe in the atomic age without destroying it.

Was Mr. Reagan right in 1978 when he shared such high hopes for the neutron bomb? And is he still right today? The crux of the neutron-bomb issue is whether the production and deployment of this weapon will somehow push us closer to the threshold between war-posturing and war fighting, or pull us back to a position of greater strength and increased deterrence. Resolving the issue requires answering difficult questions: What do neutron weapons add to the West's existing arsenal? How do military commanders foresee using them? How do the weapons fit into the policy that links Americans with Europeans?

Today, the most common rationale for building neutron bombs is to counter the Warsaw Pact nations' huge tank armies in Europe. Indeed, the East German Invasion, which would look a lot like the Warsaw if the search-lights and barbed wire were removed, still is the Soviet tactic in various stages of readiness. Really for what? Some could conceivably be intended for possible internal use within Eastern Europe; some might be for psychological effect. In an area of the world where military confrontation is largely symbolic, it is hard to know what these tanks really mean, what danger they really pose. (Continued on Page 12)

Within 1,200 acres, half the animal population would eventually be killed by the intense radiation.

Within 25 acres, virtually every unshaded living thing would be killed instantly in the blast of buildings and some tanks, destroyed or damaged.

On 500 acres, trees, as well as most animals, would eventually be killed by radiation. 200 acres also all insects, 100 acres also all bacteria, fungi, algae.

Understanding radiological weapons

- Ranges from radioactive offal from hospitals or radiological centres to materials from the core of nuclear reactors
- No formal international legal definition; there may be definitions of radioactive materials in national (criminal, environmental, health, etc.) law
 - With a few exceptions, RW were never really considered as a military tool
 - Impact of terrorist action with RW is seen as limited
 - However, one cannot ignore psychological or economic consequences
 - Decontamination would be complex and potentially costly
 - Especially in view of public concerns

Part 5

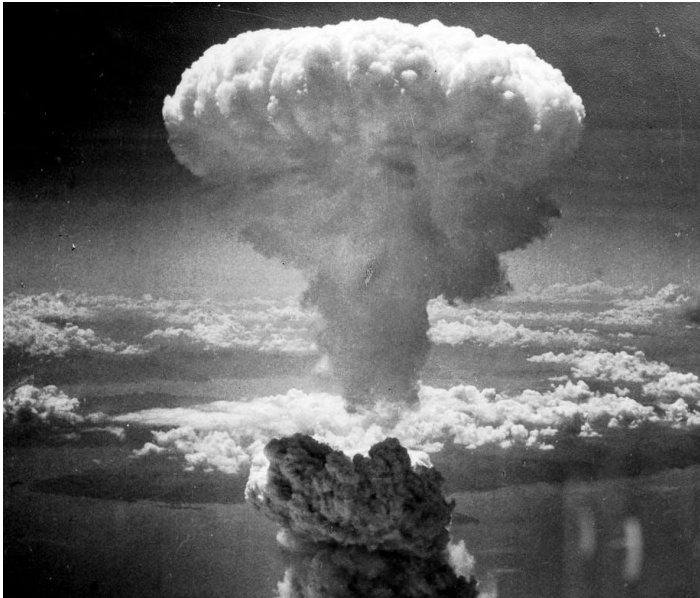
UNDERSTANDING THE SPECTRUM:

NUCLEAR WEAPONS

What is nuclear warfare?

- Use of nuclear weapons in an armed conflict
 - In a *limited* way
 - Tactical use on the battlefield
 - Escalation prevention (intra-war deterrence)
 - Escalation dominance (part of 'flexible' deterrence)
 - In an *unrestricted* way
 - Pre-emptive (decapitating) strike
 - General nuclear warfare
- Limited past use
 - Hiroshima and Nagasaki (August 1945)
 - However,
 - Nuclear testing and its human cost and environmental legacy
 - Nuclear deterrence, strategy of non-use based on willingness to use NW

Visions of Nuclear Warfare



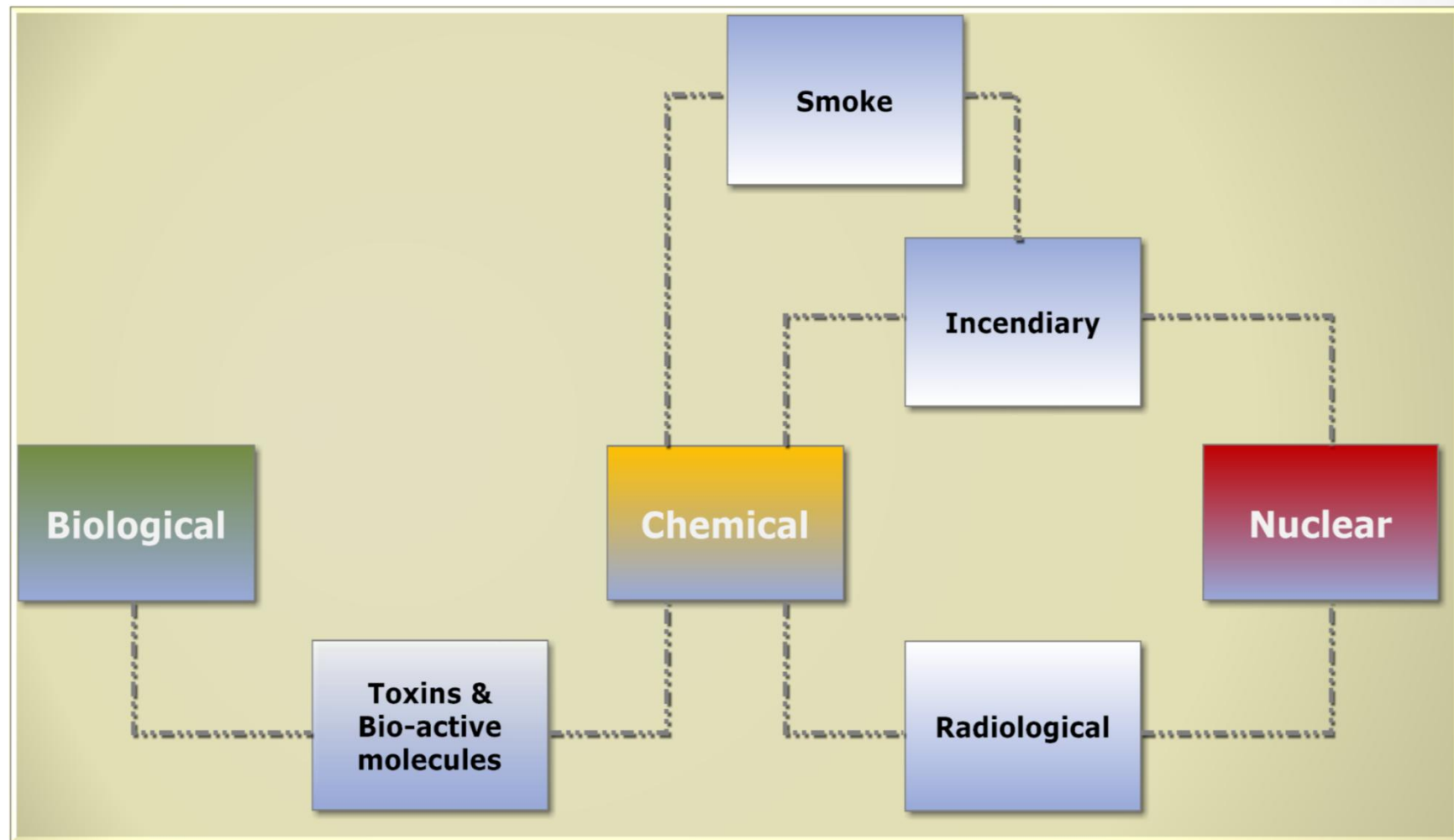
Understanding *nuclear weapons*

- Ranges from portable nuclear demolition charges to the 58Mt Vanya hydrogen bomb (Tsar Bomb)
- No universally accepted legal definition
 - Some definitions are included in regional *Nuclear Weapon-Free Zones* (but phrasing may differ)
 - Southeast Asia Nuclear Weapon-Free Zone Treaty and Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean define '*nuclear weapon*'
 - African Nuclear Weapon Free Zone Treaty and South Pacific Nuclear Free Zone Treaty define '*nuclear explosive device*'
 - Central Asian Nuclear-Weapon-Free Zone defines '*nuclear weapon or other nuclear explosive device*'
- Legality of NW possession essentially regulated via *Nuclear Non-Proliferation Treaty*
 - Equipment and materials regulated via Safeguards Agreements administered by the *International Atomic Energy Agency* (different treaty from NPT) to ensure their application to peaceful purposes
 - Nuclear Weapon States as defined under the NPT have a different legal status from Non-nuclear Weapon States

Part 6

CONCLUSIONS

The CBRN spectrum



Fuzzy boundaries between categories

- Certain weapon types share characteristics with two or more main weapon categories, e.g.
 - Toxins, radiological weapons, smoke, incendiary weapons
- Weapon evolution and history of military organisation have had an impact on the delineation of categories, e.g.
 - Why are CBW often uttered in the same breath?
 - Why do many people view smoke and incendiary weapons as CW?
 - Why are toxins covered by two major disarmament treaties?
 - Why are RW viewed as a main category?
- From a terrorism and crime perspective, agents mostly used are:
 - Toxins
 - Radioactive materials



THE TRENCH

Recalling where science, industry and military art converged
Challenging entrenched positions

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