A HISTORICAL PERSPECTIVE OF THE LIQUID AND VAPOR CHEMICAL AGENT CHALLENGE LEVELS IN CHEMICAL DEFENSE RDT&E

Joint Decontamination & Protection Conference & Exhibition

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BACKGROUND

The current "design to" liquid and vapor challenge-levels were originally instituted because of a clear and present danger.

The JRO-CBRND/IDA, the JPM-IP/RAND, the USCANUKAUS MOU, and the NATO LG7 have recently undertaken efforts to re-examine traditional chemical agent challenge levels in light of changing world events.

PURPOSE

By better understanding and appreciating the past we can form a consensus opinion on the changes that should be made for the future

OUTLINE

Historical review regarding the chemical threat perspective and its impact on challenge levels

A review of the complexities involved in determining the basis for new challenge levels

Some thoughts and recommendations to sort out the criteria for new challenge levels

The definitive reminder from the General of the Army

Current Challenge Levels

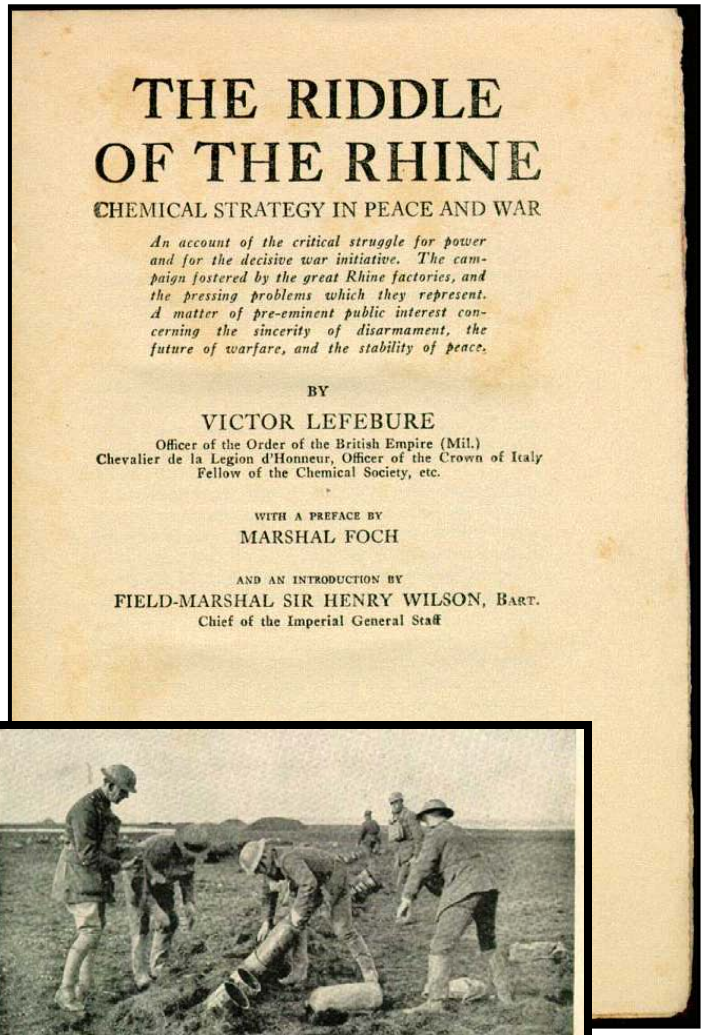
Liquid Chemical Agent

5 – to – 10 g/m2
depending on battlespace location

Vapor and Aerosol Chemical Agent concentrations over time (Ct)

2,500 – to – 10,000 mg-min/m3
depending on battlespace location

Where Our Challenge Levels Came From Post – WW I



THE RIDDLE OF THE RHINE

CHEMICAL STRATEGY IN PEACE AND WAR

An account of the critical struggle for power and for the decisive war initiative. The campaign fostered by the great Rhine factories, and the pressing problems which they represent. A matter of pre-eminent public interest concerning the sincerity of disarmament, the future of warfare, and the stability of peace.

BY

VICTOR LEFEBURE

Officer of the Order of the British Empire (Mil.)
Chevalier de la Legion d'Honneur, Officer of the Crown of Italy
Fellow of the Chemical Society, etc.

WITH A PREFACE BY

MARSHAL FOCH

AND AN INTRODUCTION BY

FIELD-MARSHAL SIR HENRY WILSON, BART.

Chief of the Imperial General Staff

THE LIVENS PROJECTOR—II.

A working party fitting electric leads and adjusting bombs prior to discharge. This work occurs at night.

"The discovery and mass production of a persistent lethal substance is likely to convert No-Man's-Land into a permanently infected gas zone…

The persistent lethal compound, which will vastly change the nature of warfare, will probably be but a slight chemical modification of some harmless substance..."

The Riddle of the Rhine, Chemical Strategy in Peace and War ...
Lefebure, Victor (1920)

http://etext.lib.virginia.edu/modeng/modengL.browse.html (UVA Library)

Where Our Challenge Levels Came From The 1960s

NATIONAL INTELLIGENCE ESTIMATE
11-11-69

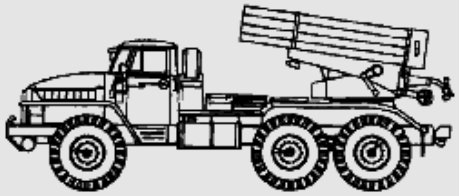
SOVIET CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES

Sanitized and Declassified 1997

Soviet CW doctrine seeks "practically instantaneous annihilation of personnel through coverage of large areas by heavy, lethal concentrations of toxic agents….Soviet military literature refers to the achievement of up to 80 percent casualties in impact areas…"

Soviet Chemical and Biological Warfare Capabilities, NIE 11-11-69

BM-21



- **Soviets Credited with WWI – type agents and with the Nerve Agents GB, GD, and V.**
- **Soviet Stockpile Estimated at ~270,000 Tons (Over Half of it Nerve Agents!)**

FROG-7

www.airpower.at/news04/0531_vyskov/vyskov2.htm

Where Our Challenge Levels Came From The 1970s

INTERAGENCY
INTELLIGENCE
MEMORANDUM
(IIM 80-10-78)

INDICATIONS AND WARNING OF SOVIET INTENTIONS TO USE CW DURING A NATO-WARSAW PACT WAR

Sanitized and Declassified 1997

http://www.mda.mil/mdalink/bcmt/srbm_2.htm

"…Warsaw Pact military writing indicates…warheads for the FROG and SCUD filled with thickened GD and fused to burst at high altitude are planned to achieve a casualty rate of up to 80 percent among unprotected personnel in an area as (large as)...1 square kilometer for the FROG and …about 2 square kilometers for the Scud."

"…The casualties would be caused primarily by skin penetration of the toxic, thickened GD "rain."

Indications and Warning of Soviet Intentions to use Chemical Weapons During a NATO-Warsaw Pact War (1978)

Posted to CIA's FOIA website on 11/13/97

Where Our Challenge Levels Came From The 1980s

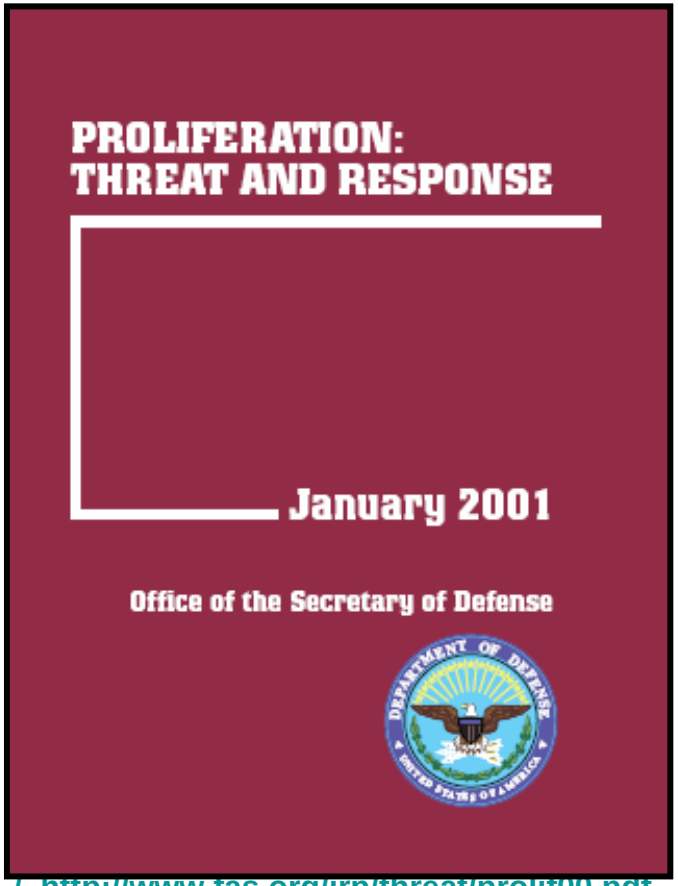
"The Soviet Union continues to test, produce and stockpile chemical weapons. They believe that the user of chemical weapons would gain a significant military advantage in a conventional conflict."

http://www.dia.mil/history/art/series_one.html

"In accordance with their doctrine, … the appropriate commander may be ordered to conduct strikes against any or all identified targets. He may use persistent agents or non-persistent agents as well as a variety of delivery systems, and will know the level of contamination to place on the target."

http://www.fas.org/irp/dia/product/smp_84_ch3.htm

Where Our Challenge Levels Came From The 1990s through 2001



/ http://www.fas.org/irp/threat/prolif00.pdf

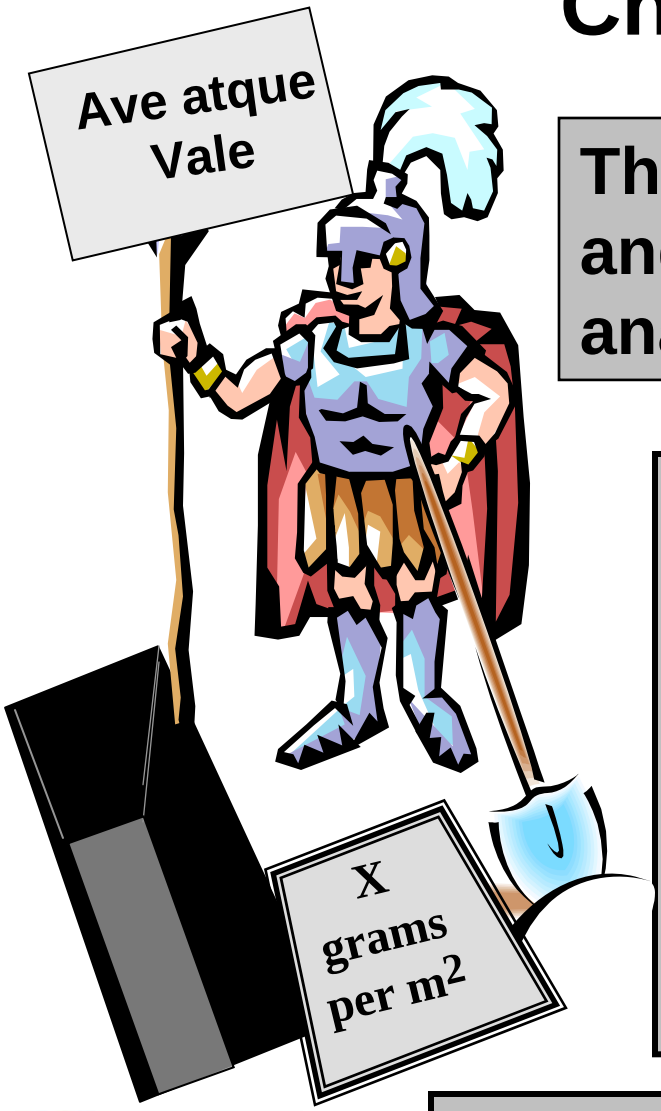
At least 25 countries now possess—or are in the process of acquiring and developing—capabilities to inflict mass casualties and destruction: NBC weapons or the means to deliver them

"Proliferation: Threat and Response"
Cohen, William S., U.S. Department of Defense, January 2001

And quoted in

***POTENTIAL MILITARY CHEMICAL/BIOLOGICAL AGENTS AND COMPOUNDS,* FM 3-11.9 etc.**
January 2005

Challenge in Transition



The old challenge levels had their time and place, and were justified by risk analyses based on Soviet doctrine.

But, if we agree that the combined capability and capacity of the Soviet CW machine were the basis for our high challenge levels…

…then we need to reconsider those levels in the light of the likely threat of tomorrow.

The tough part is finding the new rationale and weighing the risks

Some Considerations in an Era of Changing Challenge Levels

- It may take a while for the CBD community and the warfighters to develop new challenge standards – the community needs to come to consensus in the trade-off between operational effectiveness and risk of exposure.
- The test results of new decontaminants against new contamination densities and droplet distributions may not be directly comparable to the results of old decontamination testing
- Protection against liquid droplets may get tougher if agent drop distribution, and droplet velocity become test criteria – even if liquid challenge levels are reduced.
- A re-examination of the concentration and the exposure time in MIST testing should be considered if vapor and aerosol challenge levels change.
- It may be time to re-consider the WW- II concept that the duty uniform can be enhanced to provide protection against rear-area vapor and liquid challenge levels.

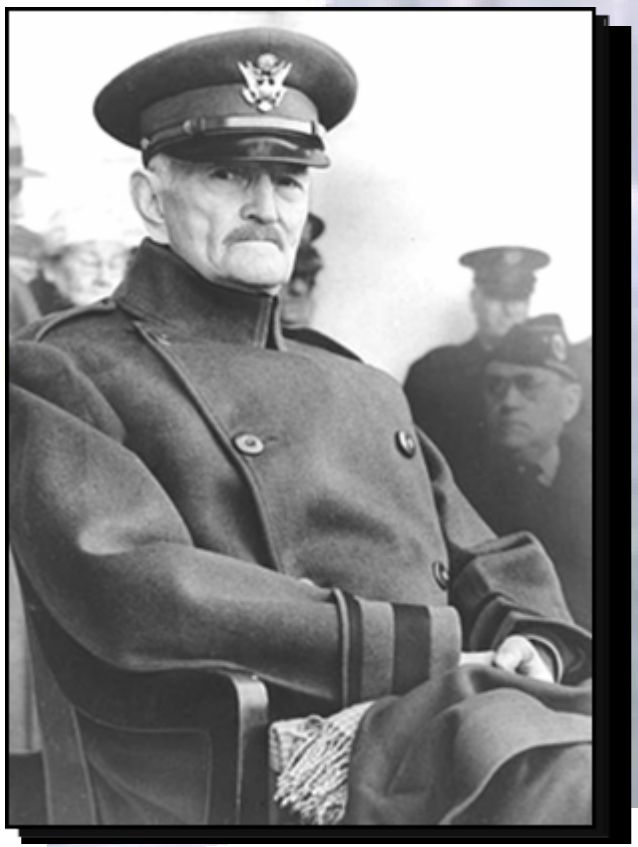
Modest Proposals for the Basis of Challenge in CBDP Requirements and Testing

STEP 1: Retain the international standard of *essential* and *desirable* protection -- but only after considering the depositions and concentrations outside of the fragmentation zone.

STEP 2: Consider developing generic forward, support, and rear area attacks to be simulated for vapor, aerosol and liquid OT challenges.

STEP 3: When planning performance tests for CP and IP systems, pre-determine their geographic placement relative to the target.

STEP 4: If liquid deposition challenges are changed, the changes will need to be incorporated in DT and OT scenarios (e.g., in "pickup and transfer" for IP, and post-attack DECON).



http://www.arlingtoncemetery.net/johnjose.htm

"…Whether or not gas will be employed in future wars is a matter of conjecture, but the effect is so deadly <u>to the unprepared</u> that we can never afford to neglect the question."

-- GEN John J. Pershing

Final Report of General John J. Pershing, Commander-in-Chief American Expeditionary Forces

(Washington, DC: U.S. Government Printing Office, 1920)

Leavenworth Papers No.10

Chemical Warfare in World War I: The American Experience, 1917 – 1918

MAJ(P) Charles E. Heller USAR

http://www-cgsc.army.mil/carl/resources/csi/Heller/HELLER.asp

Questions

BACK –UP

Thoughts on Threat Play in T&E Vignettes

We should develop vignettes that require "red team" players to follow a CW employment doctrine that makes tactical and logistical sense within the context of the scenario.

Any T&E employment doctrine should acknowledge that enemy CW stocks may be limited -- Attacks should be operationally relevant – in intensity and frequency.

Remember that chemical attacks make sense in some situations and not in others. The alternative to CW is not "no attack," -- it might be a laser-guided FRAG-HE attack.

Why, if casualties are a bigger problem than fatalities, do we assume that the adversary "always shoots for lethality?"

COMPETING FACTORS THAT SHAPE THREAT PERCEPTION

Retaliation – not in kind

Still Changing COLD WAR Paradigms

Homeland Defense

Base Protection

Revolution in Military Affairs

Transformation

Situational Awareness

Maneuverability

The effect of the Chemical Warfare Convention and the OPCW

Can we afford to ignore the worst case?

Can we afford not too?

Will the force accept greater risk?

Who is the enemy?

Does RDT&E develop against Force-on-force or Insurgency or some combination?

JRAD