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Dear Julian,

After receiving comments at DoD and another re-reading, here are some more suggested changes. Reject them or re-write as you see fit. The following notes include some related questions and explanations.

Page-Paragraph

1 - 2 The last sentence may suggest more of a deadlock than exists.

3 - 1 Mustn't we somewhere take note of WWI chemical warfare?

6 - 1 In view of uncertainty regarding stocks in Germany, we should use a less specific description. I was recently told that the total chemical stock in Germany is 47,000 tons of munitions. I will try to check this.

6 - 2 It seems unsuited to Scientific American to give Ruhles' estimate without knowing how it was obtained.

7 - 1 I understand that there is no good evidence for any continuing buildup of Soviet chemical weapons. Do you have any information on this?

7 - 1 In view of Dashiell's comment, shall we remove the implication that the U.S. seeks a successor to the 115-mm rocket system? See enclosed conversation notes.

10 - 2 Can a word be added to "oximes" to include pyridostigmine and physostigmine by implication?

10 - 2 See enclosed notes regarding therapy for GD.

12 - 3, 13 - 1 If you think that in spite of Dashiell's disagreement we should keep the substance of this, we should try to remove the implication that qualitative improvements were needed only to encourage assimilation and not for their own sake

Page-Paragraph

15 - 1 The 50 km figure given in the text may seem at variance with the suggestion given in our illustration that fatalities might occur out to no more than 20 km. The term "serious incapacitation" is rather vague but see figure legend revision. I am concerned that Fisher at page 83 of the WHO report finds Ct = 100 mg-min/m^3 at only 1.5 km of his finite 4 ton GB source. Our 5.7 ton point source gives this dosage at about 12 km. I question whether Fisher's use of Pasquil's curve relating D to h is valid for the vertically extended source he assumes.

15 - 2 Has Britain renounced the use even of U.S. chemicals?

15 - 2 Should the substance of this paragraph be transferred to the last paragraph of page 17?

16 - 2, 17 - 1 As you point out in your last letter, we are presenting the argument against like-for-like deterrence, not that for NATO having no chemicals at all.

17 - 2 Is there evidence that "The leading NATO allies have made it clear..."

18 - 1 Lennon's figure of $300-400 million to weaponize the bulk stocks would presumably add about 50,000 tons of modern chemical munitions to the stockpile. I guess the same weight of binaries might cost twice as much. Even with inflation and overruns it seems our figure is high--or else Lennon's was low. But restore the passage if you think it desirable.

21 - 2 Now that the CTB talks are badly snarled and the CW talks are looking up, the reverse of our statement may be nearer the truth. Larger issues now seem to eclipse the influence of CTB.

21 - 3 Should we delete this paragraph?

The bases for a few other changes I have not made but which may be desirable are contained in the enclosed conversation notes. Please do not cite Dashiell or me. Scientific American will send us their comments on 15 October Rev2 in about ten days. We can then combine all the changes. Incidentally, did SA reimburse you for the second (California) trip? Please let me know. At a minimum, Afghanistan will certainly sour round eleven. Damn.

as ever,

Matt

Encls.

CONVERSATION NOTES

Of Dashiell on his penciled comments to our 15 October draft

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5 BZ was never standardized, should not use words "approved fill." Munitions were filled, however, and still exist pending disposal decisions. BZ is obsolete and T.D. will provide the date.

7 "Modern delivery systems" for which our chemical weapons are not well suited are extended range artillery, tactical missiles and forthcoming aircraft such as F15 and F16. The MCI is compatible with existing aircraft such as A7, F4 and A10. The artillery projectiles can, of course, be used with the ER tubes, but only at ranges below those of which the tubes are capable. Multiple rocket launchers are not thoungt very useful for chemicals and replacement for the 115-mm Bolt system is not being sought. It is considered that such launchers are suitable for area attack using non-super-toxic agents but that they are not needed for nerve agent. It is thought that the Soviet weapons of this type are useful for agents like HCN. For air delivery, Bigeye would be much superior to Weteye.

8 All U.S. Army forces in Europe do not have the MK3. There have been two large purchases of the U.S. suit since then and there are now more of the U.S. suit in Europe than there are of the MK3. The U.S. suit is only water-repellant, not flameproof and waterproof. The outer layer is woven nylon-cotton. Unlike the MK3, the U.S. jacket can be opened in front. It has greater lifetime in toxic atmospheres and can be worn in contact with skin without irritation problems. Saturation of charcoal by hydrocarbon air pollution near motor pools, etc. is not a problem. (F. Frank had said it might be.) The U.S. gloves as well as the overboots are of butyl-rubber.

12 This refers to obidoxime being effective against GD.

13 The U.S. did not (and does not) have enough of such equipment, including masks. The 1983 date cannot be met. The XM29 mask is still in development due to problems with permeability of the face piece material. A new designation, XM30, is used for the concept now being pursued--two pieces of different transparent material molded together. Can't give a date for first production. Still, the basic design of the XM29 is thought to be excellent and will be kept in the XM30. For the time being, more of the M17A1 are being produced.

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13 Thinks last two sentences misleading in that the U.S./NATO antichemical protection goals are well beyond, not just "up to", those of existing NATO.

14 Agrees that casualty production of HE and CW cannot simply be added together. Instead, chemicals exert their own special effects, such as slowing mission performance. These effects are added to the effects of HE.

20 Thinks at least ten years is more accurate.

OTHER COMMENTS

10 Considers that available studies show TAB to be about as effective against GD as against GB. "Several median lethal doses" is accurate for both. There is no approved plan to field pyridostigmine. It and physostigmine are being studied. One attraction is that they are already approved and well studied for medical use.

Will provide illustrations for our article.

Cannot talk about our specific stockpile estimates.

Notes on meeting with Thomas Dashiell and persons from the offices of the Undersecretary for Policy and the Assistant Secretary for Program Analysis at DoD. 12 December 1979.

We overrate effectiveness of protective posture. But the government lacks good data on this themselves.

We overstate progress on bilateral. Must distinguish bilaterals from CD, which must become involved before true treaty negotiation can begin. Tempo did pick up at round ten and makes round eleven look promising.

Some increased willingness to discuss CW exists in European military circuits. The shift is not massive. We are probably right that FRG will register distaste for more forward deployment. But they ought not to object to replacement with binaries.

Bilaterals lack time-table for progress. Only CD imposes the timing pressure.

A model, not yet reviewed, indicates there are situations in which Soviets win the war if we cannot retaliate with chemicals. But this may assume only the then present protective posture.

Protective equipment procurement does not faithfully follow for dollar outlays because much of the money goes to create a new production base.

The CW munitions renovation program involves exterior cleanup, painting, testing the agent. There is no problem of nerve agent stability. Contrary impression is "figment of the imagination."

The Soviet buildup started in the late 1960's. There is no present surge, just maintaining. Big Soviet organization is primarily defensive.

U.S. stockpile is 30% bulk. Much is not usable, firable, employable. The stockpile is much less than we imply. (But I am not sure that the distinction was understood between weight of munitions and weight of agent.)

Notes on conversation with Dr. Ralph Goldman, U.S. Army Institute of Environmental Medicine, Natick, Massachusetts. 4 January 1980.

Goldman has made a very detailed study of heat balance in protective clothing under various conditions. He feels that it is incorrect to state that "...it interferes little more than ordinary clothing..." The main reason for this is that the protective suit would ordinarily be worn over existing clothing rather than only over underwear--thus an additional layer. Although our words are therefore more or less correct, two layers of ordinary clothing are effectively what a man in the protective suit is wearing. In addition, due to its close weave and water-repellant treatment, the suit has reduced permeability. He prefers to use dry bulb temperatures because evaporative cooling in the suit plays a relatively small role. He suggests that 75° would be somewhat more accurate than 80° in our sentence: "But above X°F periods of heavy exertion must be limited..." He would agree with the rest of the sentence including the reference to removing the gloves and unzippering. The British suit is thinner and therefore slightly cooler--he estimates about 2°F difference in the temperature causing equivalent heat stress to wearers of the different suits. The British suit, however, has less charcoal, would last less long in a toxic atmosphere and is somewhat less resistant to wear. He will send copies of some quantitative studies.

Notes on Talks with Chemical Officers and Others

New FM 21-40 is being drafted for internal comments. It has new MOPP definitions. Temperatures are wet bulb, hence lower than ordinary temperature. Cool is wet bulb 50-70°; warm 70-85°; hot 85-100°. MOPP one is overgarment, unzippered in front.

two adds overboots
three adds mask and hood
four adds gloves and zippers up, also has body armor.

At MOPP four, warm, heavy work may be conducted nine hours if broken into 30 min work-30 min rest cycles. Light work done at MOPP four in warm weather can go on for 15 hours with 10 min rest per hour. The mask and hood have more effect on perceived fatigue and on calculated heat loss than does the suit. If work rate is low, it is reduced 5% by MOPP 3 or 4 if weather is cool, 10% if warm and 20% if hot. For heavy work rate, the reductions are 25%, 35% and 50%. It is okay to say, as we do, that "At temperatures usually encountered in central Europe, the degradation of combat performance in full protective gear due to heat stress is minimal. But above 75-80°F periods of heavy exertion must be limited to about an hour--or else protection must be..."

A study by Dr. Ralph Goldman gives a predictive model of performance degradation under various conditions. The motivation of men in actual combat may make performance better than Goldman concludes.

Air Force has serious vision problems with existing mask. USAF has purchased 350 Honeywell IDS gas ionization 27lb nerve agent detectors at about $8,500 each. They detect 0.2-0.3 μg/liter. A lighter, cheaper Army version is being developed to be ready in about one year.

U.K. chloroprene gloves leak after about 2 hours, failing NATO STANAG of 6 hours, eventually 24 hours. Butyl-rubber less strong but does not leak. New butyl, chloroprene double dip on cotton is better. U.S. suits cost about $32, boots $5-6, gloves $10. Visual acuity is poor in U.K. mask. Probably best fielded mask is Canadian.

Our estimates of total nerve agent in U.S. munitions is accurate.

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