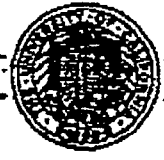


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MESSAGE:

Nov. 12, 1992

Dear Matt

This morning Don Siebenaler & Jim Zucchetto asked me to write a short textual statement about U.S. experience in chemical demilitarization. The idea is that you are do something similar about experiences of other countries, and that our two passages are then to be harmonized. Anyhow, I've written my statement, and send it herewith. It is of course a draft, regarding which criticism will be welcome.

Sincerely,

J. F. Bunnett

Drafted by J. F. Bunnett

Nov. 12, 1992

## U. S. Chemical Demilitarization Experience

Since 1969, when ocean dumping was discontinued, the U.S. has disposed of over 7,000 tons of chemical warfare agents by incineration and "neutralization".

Early destruction work (till 1974) was carried out at Rocky Mountain Arsenal, Denver, CO. Nearly 3100 tons of H ("mustard") was destroyed by incineration. A furnace that had been used for burning the rocket fuel, hydrazine, was utilized. Flue gases were "scrubbed" with alkali (NaOH) to trap acidic combustion products, and then passed thru an electrostatic precipitator to remove particulates such as tiny particles of rust.

A little later (1973-6), nearly 4200 tons of GB (Sarin) was destroyed by reaction with alkali ("neutralization"), mainly at Rocky Mountain Arsenal, but partly at Tooele Army Depot, UT (the CAMDS facility). The work in CAMDS was of experimental or development character. At both sites problems were encountered, which ultimately caused the Army to decide against neutralization as a major chemical demilitarization process. Quoting from an extensive report<sup>1</sup>, "The rationale for abandoning neutralization was based on a number of factors: (1) the sheer complexity of the process (as compared to incineration....), (2) the quantity and nature of the waste that was produced, and (3) the high capital ... and operating costs." A perplexing but frequently observed unsatisfactory feature was chemical evidence that, even when large excesses of alkali were employed, and reaction times as long as weeks, traces of GB remained. [Subsequent research<sup>2</sup> shows that the indications of undestroyed GB were probably due to an artifact in the analytical method employed.] The large amount of waste to be disposed of (largely salts after evaporation of the neutralization product solutions, which were buried in landfill) was in part due to use of large excesses of alkali in attempts to attain complete GB destruction.

Recently smaller amounts of GB(40 tons) and VX (54 tons) have been destroyed by incineration at the major JACADS facility on Johnston Atoll in the Pacific Ocean. These were in the course of Operation Verification Tests One and Two, respectively. The main purpose of these tests was to check out and "debug" various aspects of the moderately complex JACADS operation. Numerous problems were encountered during these tests, as often so when "breaking in" a new chemical plant; some had to do with the Army's demanding standards for low agent concentration of the air within the buildings and the high sensitivity of the agent detection meters. Further destruction of H, GB and VX by incineration has however been demonstrated to be technically feasible.

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1. Flamm, K. J., Q. Kwan and W. B. McNulty. "Chemical Agent and Munition Disposal: Summary of the U.S. Army's Experience". Report SAPEO-CDE-IS-87005. Program Manager for Chemical Demilitarization, Aberdeen Proving Ground, MD. 1987.

2. W. T. Beaudry, Buchanan, J. H.; Rohrbaugh, D. K., Samuel, J. B., Szafraniec, L. L. and Ward, J. R. "Analysis of Decontaminated Solutions of G Agents to Detect Reformation of Agent". Report from CRDEC, Aberdeen Proving Ground, MD. 1992.