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DEPARTMENT OF THE ARMY
OFFICE OF CHIEF, CHEMICAL CORPS
Army Chemical Center, Md.

Research Council of the Cml C Advisory Board
Bldg. 330, Rm. 103

In reply refer to:

CMLWR
RC/B-494

23 January 1948

SUBJECT: Supplemental Recommendations of the Research Council

TO : Chief, Chemical Corps
Pentagon Building
Washington 25, D.C.

1. The following are supplemental recommendations of the Research Council pertaining to studies on munitions prepared by the Dissemination Subcommittee on 19-20 September 1947, and authorized by the Research Council on 18-19 December 1947.

Recommendations on Munitions (Basic Studies)

a. The Subcommittee endorses a research program which includes basic studies designed to give information on the principles involved in the dispersion of solids and liquids. This program should be focused on the development of new weapons for those agents which merit consideration in modern warfare. These studies should be integrated with other fundamental programs on agents, aerosols and meteorology.

b. Basic studies on the mechanism of formation of particulates and aerosols should be undertaken. Two mechanisms are now recognized and complete information on these might serve as a sound basis for the development of practical munitions. The first of these is the mechanical break-up of liquids, suspensions, and solids by shearing action such as produced by cavitation in liquids, shock from explosive detonations, and high relative velocity between a liquid and a gas stream. These high velocities might be obtained practically in a munition by injecting agents into a high speed subsonic or supersonic gas stream as suggested in paragraph 4 of CMLWR-M, ltr. to Secretary, Research Council, 5 August 1947, fr. C, Res. and Engr. Division, subj.: Research Project for Studying Effect of Explosives on Dispersion of Chemical and EW Agents. The fundamental studies of the processes involved could initially be carried out on a laboratory scale without the necessity of using a large supersonic wind tunnel. The shearing might also be accomplished

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by simple explosives or by shaped charges acting to produce shock or as a source of a high velocity gas stream. The second mechanism is that of a phase change. This method includes thermal generation as applied in the oil smoke generators, critical pressure techniques with pure solvents, critical pressure techniques with mixed solvents involving retrograde condensation, and the formation of colloidal suspensions in liquids. Experience has shown that micron and sub-micron size particles are more easily formed by the proper control of conditions during a change in phase than by methods involving mechanical break-up. The practical application of this method to munitions of simple design is a major problem.

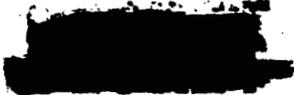
c. A further major field of basic research concerns the conditions existing in HE/chemical munitions during rupture. This would include measurement of the transmission of shock waves, cavitation, and temperature in the munitions. The effect of elasticity and strength of the casing, the size and properties of the explosive, and the geometrical conformation on these factors should be investigated.

d. The fundamental program must, of course, be correlated with research on the ballistics of chemical munitions.

e. Work on each of these projects should be preceded by a written review, summarizing existing information obtained from field and laboratory tests on chemical munitions, as well as from other sources, such as Ordnance and foreign reports. However, in view of the large number of variables involved, it is doubtful that any series of graphs or tables could be prepared to be used directly to yield a satisfactory munitions design for an agent with a given set of physical or chemical properties.

f. The Chemical Corps is working at the present time to obtain field test data on the dispersal of the G agents and of B.W. agents and needs fundamental munitions development research aimed at these specific agents. The emphasis on these lines of attack should be maintained. Well planned, practical field assessments are needed on those munitions which, from the limited data at hand, would appear to offer the best chance of giving satisfactory dispersal. It is the opinion of the Subcommittee that in many cases fundamental data can be secured more easily and more economically in well-planned laboratory experiments than in field tests on completed munitions. The desirability for eliminating a number of research projects in order to concentrate on new munitions is urgent. (Ref. RC/A-217, Min. of Research Council Meeting on 3 June 1947.)

During trials on munitions effort should be made to obtain fundamental measurements on their functioning. This aspect alone will require the effort of a considerable number of technical personnel, especially in studies on particulate sampling.



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g. It is realized that the fundamental work recommended in the above referenced memorandum (paragraph b.) might continue for several years. It is recommended that parts of this program be carried out by means of extra mural research contracts.

W. A. Hoyes, Jr.
for W. A. HOYES, JR.
Chairman
Research Council

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