Report #3

MONTHLY PROGRESS REPORT

Development of Explosives and Initiators for Special Operations (U)

by

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Remington Arms Company, Inc.
Bridgeport, Conn.

for

Picatinny Arsenal
Dover, New Jersey

Copy No. 2

DEVELOPMENT OF EXPLOSIVES AND INITIATORS
FOR SPECIAL WARFARE OPERATIONS

Initiators

Initiator work has centered around efforts to make a satisfactory improvised fuse. Because of the good results obtained with the picric acid-litharge initiator it seemed desirable to make a fuse from the same materials if possible.

In the first attempt to make a picrate fuse eight inch lengths of cotton string were immersed in a suspension of 10g. of picric acid in 20ml of water. 10g. of litharge was added and the suspension was stirred for five minutes, after which the strings were removed and air dried. The burning of this fuse was quite irregular, consisting of short, rapid bursts and intervals of smoldering. The mild confinement obtained by wrapping the fuse in cellophane tape, masking tape or even tissue paper resulted in a uniform, but much too rapid, deflagration.

In a second attempt the above procedure was repeated with 1g. of liquid glue added to the water. Burning was improved but still was too irregular.

In a third trial six 8 inch lengths of cotton string were immersed in a solution of 5g. of LePages #32 liquid glue and 5ml. of water. The strings were removed and immersed in a suspension of picrate explosive prepared by suspending 10g. of powdered picric acid in 20ml. of water, adding 10g. of litharge and stirring for 5 minutes. The strings were removed, the excess explosive was wiped off and the strings were air dried for 2 days. The resulting fuse burned uniformly at the rate of 2/3 inch per second. It gave equally good results suspended in air or resting on a thick steel block. The next step will be to assemble this fuse in the picrate initiator-booster system described in our Report No. 2, for May, 1963.

Other fuses have been made by soaking string in

a. 50% ammonium nitrate solution and
b. nitrated ethylene glycol antifreeze.

The latter gave very good results, burning with a uniform flame, but the nitrated ethylene glycol is a doubtful source because, as described below, of the relative difficulty of making it. The ammonium nitrate fuse works well suspended in air, but tended to smolder when in contact with a large heat sink, such as a heavy steel block. Wrapping in tissue paper gave some improvement.

In the search for additional improvised initiators, silver oxalate was prepared by precipitating oxalic acid with silver

nitrate. It was insensitive to shock and flame in the loose state, but detonated sharply when confined in a steel cup with the open end plugged with paper toweling. Tests in an improvised detonator are planned.

Safety tests with the improvised picrate initiator indicate that it is somewhat less sensitive to friction and percussion than lead styphnate. In a test in which the picrate explosive was blended with 25% powdered glass and drop tested using an 8 oz. weight and 0.1 inch diameter cylindrical firing pin, a 50% firing height of 8 inches was obtained. Lead styphnate in a similar test usually gives a 50% firing height of about 4 inches.

Explosives

Work on improvised high explosives has been limited to attempts to determine optimum conditions for preparing "dinitro Zerex", the nitrated ethylene glycol antifreeze, from ammonium nitrate, battery and commercial antifreeze. Ratios of reactants, order and rate of additions and reaction temperature were varied without finding any really satisfactory procedure. Under the conditions for which the product did form, yields were poor and the reaction was potentially hazardous, due to difficulty in keeping the nitration under control. Its value for improvised munitions is questionable except in cases where some special equipment and training is available.

Man Hours Expended in June

	Exempt	Non-exempt
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