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LENS DEVELOPMENT

This project is the development of plane wave explosive lenses better than currently available baratol lenses in simultaneity, principally by improving the slow explosive. An additional objective is to minimize pressure differences across the output plane.

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MASTER

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Quarterly Report for April, May, June, 1964

Engineering Order No. 814-00-007

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ABSTRACT

Nine variations of the formulation previously selected (HMX/Viton/Al) were tested during the quarter for a slow explosive to be used in a PBX lens systems. All but two showed stable velocities in a 1-inch diameter by 5-inch long rate stick; one appears to have a velocity which will approach a velocity index of 1.5 with LX-04.

PREVIOUS APPLICABLE WORK

Two samples of HMX/Aluminum/Viton powder have been evaluated and the results are reported in the Quarterly Report for January, February, March, 1964. Safety tests were performed.

DISCUSSION

Having selected the components of the slow PBX explosive and a formulation which approached the desired velocity index of 1.5, additional samples were prepared this quarter varying the amount of the different components in an effort to improve the formulation.

Eight batches were compounded for evaluation during this quarter. The composition of these formulations, from chemical analysis, is listed in Table I.

Table I

Batch Number	Composition by Weight			Avg. Particle Size Aluminum	Pressed Density (gm/cc)	Velocity (m/sec.)
	% HMX	% Viton	% Alum.			
4071-011-02	15.5	14.1	70.4	$\approx 150\mu$	2.256	5624
4097-011-01	7.01	13.59	79.40	$\approx 150\mu$	2.345	*
4104-011-02	10.59	11.11	78.30	$20 \pm 5\mu$	2.348	**
4106-011-01	13.99	10.48	75.53	$32 \pm 5\mu$	2.327	6128
4125-011-01	15.44	11.70	72.86	$\approx 150\mu$	2.300	6336
4125-011-02	16.41	12.17	72.60	$32 \pm 5\mu$	2.310	6737
4126-011-01	13.66	11.45	74.89	$\approx 150\mu$	2.311	6516
4156-011-01	16.39	13.46	70.15	$32 \pm 5\mu$	2.186	7063
4167-011-01	17.45	12.77	69.78	$\approx 150\mu$	2.303	6439

\* Did not burn completely

\*\* Burned but failed to light backup block

The powder was heated to 260°F. and pressed on the Dake Press at 19,000 psi for three minutes. Average density of the pellets used from each batch are shown in Table I. The pellets were assembled into rate sticks to determine detonation velocity. Average velocity for each batch is shown in Table I. Of the new variation, none are in the velocity range desired. (Velocity index of 1.5 or better with LX-04).

Powder from Batch 4071-011-02 which was tested last quarter was retested this quarter. The nominal target composition of the batch was 25/15/60 HMX/Viton/Al by volume. This converts to 19.8/11.45/68.75 by weight, which was the input. The output was 15.5/14.1/70.4, if the analysis was correct.

The powder was heated to 260°F. and pressed at 19,000 psi for three minutes. This resulted in an increase in density over the cold pressed 2.112 last quarter, and a corresponding increase in detonation velocity from 5132 to 5624 m/sec.

#### FUTURE WORK; COMMENTS; CONCLUSIONS

A supplier has been found for aluminum powder with a particle size between 200 and  $300\mu$  and a purchase order has been initiated to obtain this material. As soon as this material is received, a batch will be made for evaluation. In addition, two barium soaps have been received and will be used in the preparation of the aluminum powder in order to improve the density of the final H.E.

The nominal 25/15/60 (volume) powder still provides the slowest detonation velocity of any tested, and it will be further evaluated for density, composition, and velocity stability, to the exclusion of other formulations for the present.