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EXPERIMENTAL STUDY IGNITION OF THE 75-MM PACK HOWITZER

by

R. H. Kent

September 1937

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U.S. ARMY ABERDEEN RESEARCH AND DEVELOPMENT CENTER
BALLISTIC RESEARCH LABORATORIES
ABERDEEN PROVING GROUND, MARYLAND

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RHK/emh
Aberdeen Proving Ground, Md.
September 14, 1937

EXPERIMENTAL STUDY OF IGNITION OF THE 75 MM
PACK HOWITZER

Abstract

A number of types of charge were tested for the 75 mm Pack Howitzer. Of these, four gave results apparently better than obtained with the present type of charge. In three of these a quick powder was used for the base section and a slower powder for the increment. In the other type, potassium nitrate was incorporated in the powder. A study of these and the previous results indicate rather conclusively (1) that smaller dispersions in velocity are obtained with the broad banded EI projectile (band diameter .303") than with the narrow banded Mk I projectile (band diameter .301") and (2) that four of the types of charge tested in these experiments seem distinctly better than the type in service use. Suggestions are made for further experiments.

In letter dated May 17, 1935 (File No. OO 471.5/7131; APG 471.5/529-Misc.) authority was requested to try out various types of ignition in the 75 mm Pack Howitzer to improve the uniformity in velocity. It was proposed that experiments be made with a base section containing a quicker powder than the increment and also with various other types of charge. The authority to make these experiments was given in the 5th Ind. of this letter.

A number of different types of powders were used in experiments and also different types of primers. A description of the powders is given in table I and of the primers in table II.

Table I
Description of Powders

<u>Powder Lot</u>	<u>Mfr.</u>	<u>Grain Form</u>	<u>Web Thickness</u>	<u>Composition</u>
EX 1847	P.A.	Flake (Strip)	.058	N.C. - 59% (12.6%N) N.G. - 40% D.am. - 1%
EX 1848	P.A.	S.P.	.0229	N.C. - 85% (13.15%N) D.T. - 10% Dibut. - 5% KNO ₃ - 1.5% D.-am. - 1.0%
EX 1849A	P.A.	M.P.	.0268	N.C. - 59% (12.6%N) N.G. - 40% D. am. 1%
EX 1849B	P.A.	M.P.	.0342	N.C. - 59% (12.6%N) N.G. - 40% D. am. 1%
EX 1850	P.A.	S.P.	.0464	N.C. - 59% (12.6%) N.G. - 40% D.-am. 1%
1901-B	D.P.	M.P.	.0234	Fyro
X-3727-S	D.P.	S.P.	.0129	Nitrocellulose - 87.00% D.N.T. and D.B.P. - 13.00% (D.N.T. - 10%) (D.B.P. - 3%) Diphenylamine added - 1.00%
X-3671-S	D.P.	S.P.	.0221	Nitrocellulose - 83.82% D.N.T. and D.B.P. - 14.91% Diphenylamine - 0.90% Moist. and Vols. - .34%
X-3636	D.P.	S.P.	.0143	N.C. - 83.72% Diph - .90% D.N.T. and D.B.P. - 14.87% Moisture - .51%
X-3724-S	D.P.	S.P.	.0167	Nitrocellulose - 85.00% D.N.T. and D.B.P. - 15.00% (D.N.T. - 10%) (D.B.P. - 5%) Diphenylamine added - 1.00%
3738	Herc.	Flake	.0109	N.C. - 58.54% N.G. 39.48% KNO ₃ 1.29% Diphenylamine .69% Total volatiles .18%

Table II
Description of primers

<u>Primer</u>	<u>Description</u>	<u>Remarks</u>
49 gr.	Drg. No. 74-2-18	
Mod. M22	See sketch 2621D attached at end of report	
Special primer	See sketch No. 2601 AB attached at end of report	200 grs. of the powder charge were enclosed within the primer case.

Establishment of Charges

With the various powders and primers described in Tables I and II, attempts were made to establish charges within the 26,000 lb/in² pressure limit of the Howitzer. A description of the charges and of the velocity and pressure results are given in Table III. Most of the charges were enclosed in scrim bags. Additional details may be obtained from the attached firing records No. 9106 and 9708.

Table III

Rounds Fired for Establishment of Charge

Projectile 3" Shell Modified, Drg. 72-2-58, Wt. 15 lbs.

<u>Powder</u>	<u>Web</u>	<u>Comp.</u>	<u>Grain Form</u>	<u>Wt. of Chg.</u>	<u>Primer</u>	<u>No. Rds.</u>	<u>Mean Vel.</u>	<u>Prob. Error</u>	<u>Pressure</u>
EX 1847	.058	40%N.G.	Strip	7.5	49 gr.	2	725	1	
"	"	"	"	12.0	"	2	993	17	
"	"	"	"	16.0	"	2	1230	3	16,900
"	"	"	"	16.6	"	3	1294	7	19,600
EX 1848	.0229	FNH and 1.5%KNO ₃	S.P.	7.5	"	2	718	2	
"	"	"	"	12.0	"	2	955	4	
"	"	"	"	16.4	"	2	1220	1	21,200
"	"	"	"	17.0	"	5	1255	6	23,200
"	"	"	"	17.85	"	1	1297		26,100
EX 1849A*	.0268	40%N.G.	M.P.	4.25	100 gr.	5	709	2	
EX 1849A	"	"	"	4.25	49 gr:	3	866	4	
+EX 1847	.058	"	Strip	3.75					

Table III (cont'd)

Rounds Fired for Establishment of Charge

Projectile 3" Shell Modified, Drg. 75-2-56, Wt. 15 lbs.

Powder Lot	Web	Comp.	Grain Form	Wt. of Chg.	Primer	No. Rds.	Mean Vel.	Prob. Error	Pressure
EX1849A +EX1847	.0268 .058	40%N.G. "	M.P. Strip	4.25 7.75	49 gr.	2	1090	6	
EX1849A +EX1847	.0268 .058	" "	M.P. Strip	4.25 9.75	49 gr.	2	1195	18	
EX1849A +EX1847	.0268 .0586	" "	M.P. Strip	4.25 10.75	49 gr.	2	1261	21	16,900
EX1849A +EX1850	.0268 .0464	" "	M.P. S.P.	4.25 7.00	49 gr.	2	1137	4	
EX1849A +EX1850	.0268 .0464	" "	M.P. S.P.	4.25 9.00	49 gr.	4	1252	10	21,100
EX1849A +EX1849B	.0268 .0342	" "	M.P. M.P.	4.25 4.00	49 gr.	2	906	30	
EX1849A +EX1849B	.0268 .0342	" "	M.P. M.P.	4.25 6.00	49 gr.	2	1022	15	
EX1849A +EX1849B	.0268 .0342	" "	M.P. M.P.	4.25 10.00	49 gr.	2	1255	4	18,000
3671-B	.0221	FNH	S.P.	6.11**	Spec. 2601AB	3	647	1	
3671-B	.0221	"	S.P.	15.25**	"	3	1177	3	19,300
1901B +Hero.T.M. Powd. lot 3738	.0234 . . .011	Pyro Ballis- tite	M.P. Flake	11.55 .45	49 gr.	3	971	15	
1901B +Hero.T.M. 3738	.0234 . . .011	Pyro Ballis- tite	M.P. Flake	15.55 .45	49 gr.	2	1170	5	
1901B +Hero.T.M. 3738	.0234 . . .011	Pyro Ballis- tite	M.P. Flake	18.15 .45	49 gr.	2	1275	14	20,600

* Firings made at Picatinny.

** Of the total charge, 200 grains were contained in the large primer.

Table III (cont'd)

Rounds Fired for Establishment of Charge

Projectile 3" Shell Modified Drg. 75-2-58, Wt. 15 lbs.

Powder Lot	Web	Comp.	Grain Form	Wt. of Chg.	Primer	No. Rds.	Mean Vel.	Prob. Error	Pressure
3727	.0129	FNH	S.P.	5.00	49 gr.	2	680	1	
3727	.0129	"	S.P.	6.00	"	2	763	2	
3727 +3671	.0129 .0221	"	S.P. S.P.	5.25 2.75	49 gr.	2	849	0	
3727 +3671	.0129 .0221	"	S.P. S.P.	5.25 4.75	49 gr.	2	956	1	
3727 +3671	.0129 .0221	"	S.P. S.P.	5.25 8.75	49 gr.	2	1167	7	22,500
3727 +3671	.0129 .0221	"	S.P. S.P.	5.25 9.75	49 gr.	2	1215	1	25,600
3636	.0143	"	S.P.	5.00	49 gr.	2	649	10	
3636	.0143	"	S.P.	6.00	49 gr.	2	724	3	
3636 +3671	.0143 .0221	"	S.P. S.P.	5.70 6.30	49 gr.	2	1043	1	
3636 +3671	.0143 .0221	"	S.P. S.P.	5.70 8.30	49 gr.	2	1140	5	20,000
3636 +3671	.0143 .0221	"	S.P. S.P.	5.70 10.30	49 gr.	2	1240	2	26,200
3724	.0167	"	S.P.	5.00	49 gr.	2	619	0	
3724	.0167	"	S.P.	7.00	49 gr.	2	753	8	
3724 +3671	.0167 .0221	"	S.P. S.P.	6.25 6.75	49 gr.	2	1074	12	
3724 +3671	.0167 .0221	"	S.P. S.P.	6.25 8.75	49 gr.	2	1174	1	
3724 +3671	.0167 .0221	"	S.P. S.P.	6.25 10.25	49 gr.	2	1268	8	25,500
3724 +3671	.0167 .0221	"	S.P. S.P.	6.25 10.05	49 gr.	3	1245	6	25,600

It will be noted that although lots 3627 and 3636 gave very promising results at the 700 ft/sec. velocity, it was found impossible when these powders were combined with 3671 to obtain the service muzzle velocity of 1250 f/s, without exceeding the maximum pressure of 26,000 lbs/in².

Uniformity Firings

Of the various types of charge with which it was found possible to obtain the service velocity within the pressure limit four were chosen as the most promising. In addition, for one of the types of charge a modified M22 primer was used in addition to the 49 gr. primer. This modified M22 primer was used because of the very satisfactory results obtained with a somewhat similar primer in a 75 mm Gun M1897. The results obtained in the uniformity test are given in Table IV. The probable errors are based on the standard deviations.

Table IV

Uniformity Results (Solenoid Chronograph unless otherwise noted)
Projectile: 3" Shell Modified, Wt. 15 lbs.

Powder Lot	Web	Comp.	Grain Form	Wt. of Chg.	Primer	No. Rds.	Mean Vel.	Prob. Error	Pressure
1848	.0229	FNH+ 1.5%KNO ₃	S.P.	7.3	49 gr.	10	687	5.2	
1848	.0229	"	"	17.0	49.gr.	10	1257	3.5	22,700
1849A*	.0268	40%N.G.	M.P.	4.25	100 gr.	5	709+	2.3	
1849A	.0268	"	"	4.25	49 gr.	5	638	5.1	
1849A +1849B	.0268 .0342	40%N.G. "	" "	4.25 9.90	49 gr.	6	1246	6.4	18,100
3724	.0167	FNH	S.P.	6.25	49 gr.	10	706	4.0	
3724 +3671	.0167 .0221	FNH FNH	" "	6.25 10.05	49 gr.	10	1252	5.5	24,100
3724	.0167	FNH	"	6.25	2621D	10	696	5.4	
3724 +3671B	.0167 .0221	FNH FNH	" "	6.25 10.05	2621D	10	1237	4.5	23,100
3671	.0221	FNH	"	6.80	2601AB	10	683**	7.9**	
3671	.0221	FNH	"	16.00	2601AB	10	1217**	11.6**	20,800

* These rounds fired at Picatinny have also been included in Table I

** Mean results for two 5 round groups.

+ Doumenge chronograph.

Discussion of Results

It will be seen that with all of the types of charge except the one containing the large special primer, 2601AB, dispersions of approximately equal magnitude were obtained while the 2601AB primer produced dispersions which seem significantly larger. In order that the results obtained in these uniformity firings may readily be compared with those obtained in the previous tests, some of the more important previous results are given in the Tables V and VI. The probable errors for most groups are based on the mean deviations.

Table V

Results Obtained with the 15 lb. E-1 Projectile*

Powder Lot	Web	Comp.	Grain Form	Wt. of Chg.	Primer	No. Rds.	Mean Vel.	Prob. Error in Vel.
3671	.0221	FNH	S.P.	6.00 to 6.11	100 gr.	24	700	5.0
3671	.0221	"	S.P.	15.17 to 15.28	100 gr.	39	1240	4.1

Table VI

Results Obtained with the Mk I Shell Loaded to 15 lb.
(Mostly from O.P. 4562)

Powder Lot	Web	Comp.	Grain Form	Primer	Wt. of Chg.	No. Rds.	Mean Vel.	Prob. Error	Pressure
1062	.0180	Pyro	S.P.	100 gr.	5.41	23	700	6.2	
3530	.0183	FNH	S.P.	100 gr.	6.22	25	691	10.0	
3625	.0208	FNH	M.P.	100 gr.	7.00	25	706	9.0	
3671	.0221	FNH	S.P.	100 gr.	6.97	23	695	11.4	
3671-S	.0221	FNH	S.P.	100 gr.	16.13	5	1255	4.2**	21,800
3671-S	.0221	FNH	S.P.	100 gr.	16.13	5	1234	8.1***	21,600
3698	.0228	FNH	S.P.	100 gr.	6.62 to 6.70	20	705****	6.9****	
					15.70	20	1254****	4.0****	

* The results are based on the same data as the results given in "Analysis of Velocity Dispersion of 75 mm Pack Howitzer" by R. H. Kent (1932)

** Powder loose F.R. No. 6310

*** Powder in bag

**** Mean results from scrim and silk bags (see Firing Record No. 8211)

Table V gives results obtained of firings of the 15 lb. M1 projectile having a broad band of diameter of 3.03" while Table VI results obtained with the 15 lb. Mk. I projectile with a narrower band of diameter 3.01". By comparing the results obtained with the same powder for the two projectile types it appears that the dispersion obtained with the broad banded E-1 projectile (band diameter 3.03") is significantly smaller than with the narrow banded projectile (band diameter 3.01") indicating that an increase of initial forcing resistance tends to reduce the dispersion in velocity from this howitzer. Attention to this result has already been directed in a study written in the Office of the Chief of Ordnance.

Although the results show rather conclusively that with a given type of powder, smaller dispersion is obtained with the broader band, this result by itself, does not establish the superiority of the broad band in general. With the broad band and a given powder the pressures are higher, than with the narrow band. To remain within the pressure limits of the howitzer, a slower powder has to be used with the broad than with the narrow band. If the narrow banded projectile were propelled by as quick a powder as the pressure limits allow, the dispersion in velocity would be considerably reduced and might not greatly exceed the dispersion obtained with the broad banded projectile propelled by 3671.

It is apparent by comparing the results given in Table VI with those of Table IV that with the exception of the 2601AB arrangement the types of charge described in Table IV seem materially better than those given in Table VI. However, as pointed out above, the powders of Table VI are unnecessarily slow for the narrow band.

The tests show that in the 75 mm Pack Howitzer it is possible to combine a base section of a fast powder with an increment of a slower powder with satisfactory results. How much of the improvement is due to the powder and how much to the use of the 49 grain primer is not known. It appears that possibly the 100 grain primer is too powerful to use with these quick powders and small chamber capacity.

The results seem to be consistent with the generally accepted hypothesis that the quicker the powder, the better the uniformity in the lower zones of a howitzer; but these and other results apparently also indicate that an increased effective quickness of the charge obtained by the use of powerful black powder igniter is not necessarily conducive to uniformity in velocity.

In spite of its relative slowness, the powder 18⁴⁸ containing KNO_3 and having a web-thickness of .0229 gave practically as good results for the 700 ft/sec. velocity as the quicker powder 372⁴, web .0167, so far as can be inferred from the small number of rounds fired. This tentative result is perhaps an indication that in addition to the quickness of a powder, its ignitability may be an important factor in the velocity dispersion. Possibly one of the chief advantages of a quick powder is that other things being equal, a quick powder is more readily ignitable than a slower one.

In connection with the design of charges of high density of loading the result is fairly well established that a type of charge which produces no waves of appreciable amplitude tends to produce a smaller velocity dispersion than a type which produces large waves. If there are waves, their amplitude will vary from round to round and hence will produce a variation in velocity. In general, charges of low loading density produce no waves and yet a large dispersion in velocity is almost the rule with such charges. As mentioned above it is found that an increase in the quickness of the powder and in the starting resistance tends to reduce the dispersion in velocity of such charges. The reason for this pronounced effect of quickness and resistance is not so apparent as the reason for the effect of pressure waves on dispersion. It is evident that the quicker the powder and the higher the pressure, the greater the proportion of the energy of the powder converted into the kinetic energy of motion. If the powder were all burnt before the projectile started, the maximum amount of energy would be obtained from a given charge; aside from variable heat losses, this amount would be constant from round to round and the dispersion in velocity would be zero. The quicker the powder the more closely is this condition approximated to; hence the reduction of velocity dispersion by quicker powders.*

Although the preceding theory tends to explain the observed results, it is believed that it does not explain satisfactorily the very great reduction in dispersion with only a small increase in quickness. It is proposed to discuss this matter at greater length in a report to be entitled "A Tentative Theory of the Effect of Powder Quickness and Band Resistance on the Dispersion in Muzzle Velocity".

In view of the results given in this report, it appears that the recent reduction in the width and diameter of the

* See also 'The Accuracy of Gun Fire as Affected by Loading Conditions' by Philip L. Alger, Capt. Ord. Res. Corps, U.S.A.

rotating band of the M11 shell will tend to augment the dispersion in velocity.* Unless success is obtained in reducing the present large dispersion obtained with the narrow band, the change may prove unfortunate so far as the accuracy of fire of the howitzer is concerned. Apparently this dispersion can be reduced; whether as good results can be obtained with the narrow band as with the broad band remains to be seen.

Since most of the emphasis on these firings was on the lowest zone charge in which the pressure waves would probably be small, no piezo-electric records were taken. However, records of $\frac{dp}{dt}$ in the early stages of the burning might give valuable information, and in the proposed further firings it is desirable that such records be taken.

Further Tests

In view of the fact that considerable improvement appears already to have been obtained in the charge for the lowest zone of the Pack Howitzer, it is advisable that experiments be continued. It is recommended that firings be made with the following types of charges:

<u>Type No.</u>	<u>Base Section</u>	<u>Increment</u>	<u>Primer</u>
I	Fast N.G. powder	Slower N.G. powder	49 gr.
II	Fast FNH powder containing KNO_3	Slower FNH powder with or without KNO_3	49 gr.
III	Fast FNH	Slower FNH	49 gr.
IV	FNH of the same quickness as in the increment	FNH as quick as the pressure limits allow	49 gr.

After the best type of charge ignited by the 49 gr. primer has been selected, comparative tests should be made with the 100 gr. primer and the modified M22 primer, 2621D, for this type of charge to establish definitely which of the three primers is the best.

For the proposed firings, the following types of powders should be made by Picatinny Arsenal.

* The Proving Ground concurred in the proposed change. It is stated in the 1st Ind. on O.O. 471.12/2943, "It appears that there should be little chance of any great increase in velocity dispersion".

Powder type	Composition	Grain Form	Web Thickness in.	Amount lb.
1	40% N.G.	S.P.*	.027	50
2	"	"	.032	50
3	"	"	.037	50
4	FNH+ 1.5% KNO ₃	"	.018	50
5	FNH+ 1.5% KNO ₃	"	.021	50
6	FNH+ 1.5% KNO ₃	"	.024	50

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- 4 Incls.
Incl. 1, F.R. #9703
Incl. 2, F.R. #9106
Incl. 3, Sketch 2621-D
Incl. 4, Sketch 2601-AB

* S.P. grain form is suggested for the 40% N.G. powder to reduce the number of variables in this experiment by making the grain form of all the powders the same.

ABERDEEN PROVING GROUND FIRINGS

27
11

Object of Firing: Study of Uniformity of Velocity in 75 M/M Pack Howitzer M1 with various powders and primers

Date of Firing: Febol & 3, March 30 & April 1, 1933
 Firing Order: 9708
 Sheet of 12
 T. T. P.
 G. C. M. Ben
 Project xxx No. KR 168
 Contract No.
 G. C. Ben
 A. I. in File
 P. O. No. 303-6-1

DEVELOPMENT

Project xxx No. KR 168

Related F. B. Nos.

ie

CANNON	MODEL	MANUFACTURER	N. O.	NO. OF SHEETS
Cannon.....	75 M/M Pack Howitzer	M1	Waterliet Arsenal	3 858
Carriage.....	75 M/M Pack Howitzer	1923 M1	Rock Island Arsenal	2 22
Recoil Mech.	75 M/M Pack Howitzer	M3A1	Rock Island Arsenal	12 46
Mouth of line of fire	Main Front - Powder Range		Detection from	M.F. 150
Gun position	Main Front - Powder Range		Target	
Projectile	3" C.S. Shell, Model 1917, modified to 75 M/M Proof Projectile, S.A. Wood & Co. Lot 8232-1, Drg. 75-2-158			
Bursting charge	None			
Booster	None			
Fuze	None			
Powder	D.P. FMH Lot X-3724-S-1933 for 155 M/M Howitzer D.P. FMH Lot X-3671-S-1930 for 75 M/M Pack Howitzer, M1 P.A. Experimental Lot 1848 for 75 M/M Pack Howitzer P.A. Experimental Lot 1849A for 75 M/M Pack Howitzer P.A. Experimental Lot 1849B for 75 M/M Pack Howitzer			
Case xxxx	M5, Drg. 71-2-91			
Igniter				
Primer	49 Gr. Perc. U.S.C. Lot 2672-192, Drg. 74-2-18 (Rds. 859 - 879, 885 - 889, 900 - 910, 1029 - 1038, 1049 - 1062, & 1023) Special 2601 AB Arrangement (Rds. 880 - 884, 911 - 915, 1024 - 1028, 1063 - 1067) 122 Perc. P.A. Lot 1285-2, Drg. 75-2-35 (Rds. 890 - 899, 1039 - 1048) Modified in accordance with Sketch 2621-D			

GENERAL DATA BY ROUNDS

1937 DATE	ROUND NO.	TIME OF FIRING	PROJECTILE		POWDER			ELEVATION		FINAL CORRECTED SOL.		
			No.	WEIGHT AS FIRED lbs.	Lot	Box No.	CHARGE WEIGHT ozs.	Deg.	Min.	PRESSURE	VELOCITY	
Feb.												
1	859	1:32		15	3724-S			6.25	1	55		703
	860	1:39		"	1848			7.3	"	"	1200	700
	861	1:41		"	"			"	"	"	2100	696
	862	1:43		"	"			"	"	"	1600	690
	863	1:44		"	"			"	"	"	1600	685
	864	1:46		"	"			"	"	"	2000	686
	865	1:48		"	"			"	"	"	1700	689
	866	1:49		"	"			"	"	"	1800	683
	867	1:51		"	"			"	"	"	2600	674
	868	1:53		"	"			"	"	"	2000	680
	869	1:56		"	"			"	"	"	1900	684
	870	2:16		"	"			17	"	"	22000	1249
	871	2:19		"	"			"	"	"	23200	1255
	872	2:21		"	"			"	"	"	23300	1263
	873	2:23		"	"			"	"	"	21800	1248
	874	2:25		"	"			"	"	"	22300	1262
	875	2:27		"	"			"	"	"	23700	1257
	876	2:29		"	"			"	"	"	22900	1258
	877	2:30		"	"			"	"	"	21900	1258
	878	2:33		"	"			"	"	"	21200	1260
	879	2:35		"	"			"	"	"	23800	1259
	880	2:49		"	3671-S			6.8	"	"	6100	694
	881	2:51		"	"			"	"	"	2100	686
	882	2:53		"	"			"	"	"	1300	672
	883	2:54		"	"			"	"	"	1800	664
	884	2:56		"	"			"	"	"	1600	671
	885	2:58		"	1849A			4.25	"	"	1600	648
	886	2:59		"	"			"	"	"	1900	634
	887	3:00		"	"			"	"	"	1300	643
	888	3:02		"	"			"	"	"	1800	635
	889	3:05		"	"			"	"	"	1600	631
	890	3:17		"	3724-S			6.25	"	"	1000	683
	891	3:21		"	"			"	"	"	2000	702
	892	3:23		"	"			"	"	"	2900	693
	893	3:24		"	"			"	"	"	2300	698
	894	3:26		"	"			"	"	"	2000	698
	895	3:28		"	"			"	"	"	2500	704
	896	3:29		"	"			"	"	"	9500	688
	897	3:32		"	"			"	"	"	1400	696
	898	3:34		"	"			"	"	"	10000	709
	899	3:35		"	"			"	"	"	9600	691

GENERAL DATA BY ROUNDS

1937 DATE	ROUND NO.	TIME OF FIRING	PROJECTILE			POWDER			ELEVATION		FINAL CORRECTED	
			No.	WEIGHT AS FIRED lbs.		Lot	Box No.	CHARGE WEIGHT ozs.	Deg.	Min.	Pressure	Vel. ft./sec.
Feb.	3	900		15		3724-S		6.25	2	0		693
		901		"		"		"	"	"		703
		902		"		"		"	"	"		710
		903		"		"		"	"	"		695
		904		"		"		"	"	"		702
		905		"		"		"	"	"		701
		906		"		"		"	"	"		711
		907		"		"		"	"	"		705
		908		"		"		"	"	"		712
		909		"		"		"	"	"		713
		910		"		"		"	"	"		709
		911		"		3671-S		6.8				696
		912		"		"		"				695
		913		"		"		"				696
		914		"		"		"				674
		915		"		"		"				684
Mar.	30	1023		15		3671-S		6.8	1	07		672
		1024		"		"		16			20600	1217
		1025		"		"		"			20200	1204
		1026		"		"		"			20100	1226
		1027		"		"		"			21300	1226
		1028		"		"		"			21600	1229
		1029		"		3724-S & 3671-S		16.30			24600	1256
		1030		"		" " "		"			23500	1247
		1031		"		" " "		"			24000	1252
		1032		"		" " "		"			23900	1243
		1033		"		" " "		"			23900	1243
		1034		"		" " "		"			25000	1256
		1035		"		" " "		"			24000	1267
		1036		"		" " "		"			23300	1248
		1037		"		" " "		"			24200	1260
		1038		"		" " "		"			24400	1246
		1039		"		" " "		"			23500	1247
		1040		"		" " "		"			24400	1236
		1041		"		" " "		"			23200	1235
		1042		"		" " "		"			23700	1235
		1043		"		" " "		"			24200	1242
		1044		"		" " "		"			22900	1237
		1045		"		" " "		"			23200	1238
		1046		"		" " "		"			23900	1241
		1047		"		" " "		"			21900	1222
		1048		"		" " "		"			22600	1238

GENERAL DATA BY ROUNDS

1937 DATE	ROUND NO.	TIME OF FIRING	PROJECTILE		POWDER			ELEVATION Feet.	FINAL CORRECTED	
			No.	WEIGHT AS FIRING Used	Lot	Box No.	CHARGE WEIGHT Oz.		PRESSURE	Sol. Velocity
March	1049	10:55		15	1049A & 1049B			0.25	6200	931
	1050	10:57		"	" " "		"	"	4000	831
	1051	10:59		"	" " "		10.25	"	7700	1009
	1052	11:02		"	" " "		"	"	9300	1076
	1053	11:07		"	" " "		14.25	"	17100	1251
	1054	11:09		"	" " "		"	"	19000	1278
	1055	11:48		"	" " "		14.15	"	16500	1237
	1056	11:51		"	" " "		"	"	18500	1272
	1057	11:52		"	" " "		"	"	20000	1253
	1058	11:54		"	" " "		"	"	17300	1235
	1059	11:56		"	" " "		"	"	18000	1250
	1060	11:58		"	" " "		"	"	17700	Lost
	1061	12:00		"	" " "		"	"	18400	1252
	April	75 #/H Pack How.M1, No. 3 mounted on 75 #/H Pack How.Carriage, #3A1, No. 13								
1	1062	10:22		"	3671-5			12	1 6	957
	1063	10:30		"	"			16		17800
	1064	10:32		"	"			"		20800
	1065	10:35		"	"			"		21700
	1066	10:38		"	"			"		21600
	1067	10:47		"	"			"		21900

Rds. 859, 900, 1023, 1049 & 1062, warning rounds.

For make up of charge see Sheet No. 11.

ABERDEEN PROVING GROUND FIRINGS

F. R. No. 9708
Sheet 5 of 12

VELOCITY DATA

Cannon 75 M/M Pack How. M1, No. 3 Fired by Lt. J. W. Hansborough on Feb. 1st & 3rd, March 30 and April 1, 1937

Screen Distances	Feb. 1	GUN TO FIRST	HORIZONTAL	CORRECTED TO	BETWEEN	HORIZONTAL	CORRECTED TO
	Feb. 3	Coil	49.68 ft.		Coil	99.090 ft.	
	Feb. 1	Coil	50.23 ft.		Screen	92.02 ft.	
	Feb. 3	Screen	40.23 ft.		Screen	76.25 ft.	
	Feb. 3	Screen	40.82 ft.		Screen	76.83 ft.	

ROUND NO.	TIME OF FIRING	FORM FACTOR	BOULENGE					SOLENOID	
			CHRONOGRAPH NUMBER			MEAN INSTRUMENTAL	MUZZLE VELOCITY	INSTRUMENTAL	MUZZLE VELOCITY
			1947	1335	1305				
859	1:32	1 - 1.01	698	693	693	695	697	700	703
860	1:39		695	692	**	694	696	697	700
861	1:41		690	682	**	686	688	693	696
862	1:43		684	680	**	682	684	687	690
863	1:44		684	681	685	683	683	682	685
864	1:46		685	682	686	684	686	683	686
865	1:48		686	683	687	685	687	686	689
866	1:49		680	680	682	681	683	680	683
867	1:51		673	673	674	673	675	671	674
868	1:53		678	676	678	677	679	677	680
869	1:56		683	681	683	682	684	681	684
870	2:16		1240	1235	1239	1238	1245	1239	1249
871	2:19		1247	1246	1249	1247	1254	1245	1255
872	2:21		1257	1256	1257	1257	1264	1253	1263
873	2:23		1241	1238	1240	1240	1247	1238	1248
874	2:25		1257	1257	1259	1258	1265	1252	1262
875	2:27		1247	1249	1249	1248	1255	1247	1257
876	2:29		1251	1250	1254	1252	1259	1248	1258
877	2:30		**	1249	1251	1250	1257	1248	1258
878	2:33		1251	1255	1254	1253	1260	1250	1260
879	2:35		1251	1253	1254	1253	1260	1249	1259
880	2:49		692	692	689	691	693	691	694
881	2:51		684	682	682	683	685	683	686
882	2:53		670	671	669	670	672	669	672
883	2:54		662	663	662	662	664	661	664
884	2:56		669	669	669	669	671	668	671
885	2:58		644	645	644	644	646	645	648
886	2:59		631	634	630	632	634	631	634
887	3:00		641	642	641	641	643	640	643
888	3:02		634	634	634	634	636	632	635
889	3:05		629	630	629	629	631	628	631
890	3:17		680	679	680	680	682	680	683
891	3:21		698	698	698	698	700	699	702
892	3:23		690	692	691	691	693	690	693
893	3:24		700	701	701	701	703	695	698
894	3:26		698	699	698	698	700	695	698
895	3:28		702	704	702	703	705	701	704
896	3:29		685	685	685	685	687	685	688
897	3:32		694	691	692	692	694	693	696
898	3:34		707	707	707	707	709	706	709
899	3:35		689	690	689	689	691	688	691

NOT REPRODUCIBLE

ABERDEEN PROVING GROUND FIRINGS

F. R. No. 9708
Sheet 6 of 12

VELOCITY DATA

Feb. 1 & 3, March 30 &

Cannon 75 M/M Pack How, M1, No. 3 Fired by Lt. J. W. Hansborough on April 1, 1937

Screen Distances	GUN TO FIRST	HORIZONTAL	CORRECTED TO	BETWEEN	HORIZONTAL	CORRECTED TO
April 1	Coil	42.21 ft.		Coil	99.560 ft.	
Mar. 30	Screen	32.44 ft.		Screen	120.52 ft.	
April 1	Screen	33.74 ft.		Screen	120.51 ft.	

ROUND NO.	TIME OF FIRING	FORM FACTOR	BOULENGÉ					SOLENOID	
			CHRONOGRAPH NUMBER			MEAN INSTRUMENTAL	MUZZLE VELOCITY	INSTRUMENTAL	MUZZLE VELOCITY
			1947	1335	1305				
900	2:23	1 - 1.01	698	691	698	696	698	690	693
901	2:31		708	702	707	706	708	700	703
902	2:32		715	711	715	714	716	707	710
903	2:34		701	701	699	700	702	692	695
904	2:36		702	703	704	703	705	699	702
905	2:37		703	705	704	704	706	698	701
906	2:38		717	715	716	716	718	708	711
907	2:40		708	708	708	708	710	702	705
908	2:41		715	712	715	714	716	709	712
909	2:42		718	717	717	717	719	710	713
910	2:44		709	708	709	709	711	706	709
911	2:45		696	696	696	696	698	693	696
912	2:46		696	694	695	695	697	692	695
913	2:48		700	698	699	699	701	693	696
914	2:49		678	679	679	679	681	671	674
915	2:50		(a)	687	688	688	690	681	684
1023	9:43		-----Off end of rods-----					669	672
1024	9:51		1212	1203	1206	1207	1215	1208	1217
1025	9:54		1197	1196	1196	1196	1204	1195	1204
1026	9:56		1218	1221	1215	1218	1226	1217	1226
1027	9:59		1221	1222	1216	1220	1228	1217	1226
1028	10:02		1224	1226	1221	1224	1232	1220	1229
1029	10:04		1249	1251	1245	1248	1257	1246	1256
1030	10:06		1241	1243	1238	1241	1250	1238	1247
1031	10:09		1246	1250	1244	1247	1256	1243	1252
1032	10:11		1239	1241	1239	1240	1249	1234	1243
1033	10:14		1235	1240	1234	1236	1245	1234	1243
1034	10:17		1249	1247	1246	1247	1256	1246	1256
1035	10:19		1262	1257	1258	1259	1268	1257	1267
1036	10:22		1244	1243	1240	1242	1251	1239	1248
1037	10:25		1252	1251	1251	1251	1260	1250	1260
1038	10:27		(b)	1244	1240	1242	1251	1237	1246
1039	10:30		(c)	1241	(a)	1241	1250	1238	1247
1040	10:32		1232	1234	1231	1232	1241	1227	1236
1041	10:35		1232	1229	1229	1230	1239	1226	1235
1042	10:37		1232	1229	1228	1230	1239	1226	1235
1043	10:40		1239	1234	1234	1236	1245	1233	1242

ABERDEEN PROVING GROUND FIRINGS

F. R. No. 9708
Sheet 7 of 12

VELOCITY DATA

Cannon 75 M/M Pack How.Ml. No. 3 Fired by Lt. J.W. Hansborough on Feb. 1 & 3, March 30 & April 1, 1937

Screen Distances (See Sheet 6)	GEN TO FIRST	HORIZONTAL	CORRECTED TO	BETWEEN	HORIZONTAL	CORRECTED TO
	Coil			Coil		
	Screen			Screen		

ROUND NO.	TIME OF FIRING	FORM FACTOR	BOULENOÉ					SOLENOID*	
			CHRONOGRAPH NUMBER			MEAN INSTRUMENTAL	MUZZLE VELOCITY	INSTRUMENTAL	MUZZLE VELOCITY
			1247	1335	1305				
1044	10:43	1 - 1.01	1229	1229	1228	1229	1238	1228	1237
1045	10:46		1232	1234	1231	1232	1241	1229	1238
1046	10:49		1233	1229	1231	1231	1240	1232	1241
1047	10:51		1217	1211	1214	1214	1222	1213	1222
1048	10:53		1232	1229	1229	1230	1239	1229	1238
1049	10:55		930	930	928	929	932	927	931
1050	10:57		881	879	879	880	883	877	881
1051	10:59		1008	1008	1004	1007	1011	1004	1009
1052	11:02	1034	1038	1032	1035	1037	1031	1036	
1053	11:27	1244	1249	1244	1246	1255	1241	1251	
1054	11:29	1251	1251	1251	1251	1260	1248	1258	
1055	11:48	1232	1228	1229	1230	1239	1228	1237	
1056	11:51	1241	1239	1239	1240	1249	1233	1242	
1057	11:52	1256	1255	1253	1255	1264	1248	1258	
1058	11:54	1232	1234	1229	1232	1241	1226	1235	
1059	11:56	1244	1246	1241	1244	1253	1240	1250	
1060	11:58	1235	1238	1234	1236	1245		Lost	
1061	12:00	1247	1244	1244	1245	1254	1242	1252	
1062	10:22	964	965	965	965	968	963	967	
1063	10:30	1169	1170	1170	1170	1177	1169	1177	
1064	10:32	1209	1214	1210	1211	1219	1207	1216	
1065	10:35	1205	1206	1206	1206	1214	1202	1211	
1066	10:38	1227	1227	(a)	1227	1235	1225	1234	
1067	10:47	1221	1220	1222	1221	1229	1219	1228	

*This correction from Instrumental Velocity to Muzzle Velocity includes a Tuning Fork correction.

- **= No mark on rod.
- a = No. 2 did not break.
- b = No. 1 jarred down.
- c = No. 2 jarred down.
- d = No. 5 jarred down.

ABERDEEN PROVING GROUND FIRINGS

F. R. No. 9708
 Sheet 6 of 12
 Date: Feb. 1 & 3,
 March 30 & April
 1, 1927

PRESSURE DATA

Type of gauge Minor Cal. Army Type
 Position of gauge In base of cartridge case.
 Metal of crusher cylinder Jan. 19, 1924. Annealed Nov. 12 - 14, 1929
 Initial compression 0

ROUND NO.	BAND DIAM. INS.	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	MEAN
860		991	15	11	9					12
861		974	19	47	22					21
862		9	18	1221	13					16
863		313	18	35	13					16
864		1013	15	1175	24					20
865		504	21	966	13					17
866		1219	18	787	18					18
867		1002	28	919	24					26
868		6	21	1040	18					20
869		506	19	218	18					19
870		847	220	1075	220					220
871		1215	234	936	230					232
872		993	235	37	231					233
873		24	224	1114	211					218
874		80	224	938	232					228
875		502	240	824	234					237
876		42	236	567	222					229
877		1079	215	10	222					219
878		1041	209	1178	215					212
879		521	234	921	241					238
880		980	16	892	105					61
881		828	24	608	18					21
882		1004		1213	13					13
883		268	18	802	18					18
884		1053	18	949	13					16
885		22	13	842	18					16
886		876	19	915	18					19
887		754		1028	13					13
888		1203		968	18					18
889		670		962	16					16
890		981	11	1050	8					10
891		959	30	132	9					20
892		922	32	1039	25					29
893		1217	26	953	20					23
894		34	18	970	22					20
895		857	18	31	31					25
896		880	93	307	97					95
897		1474	9	1031	18					14
898		820	105	984	94					100
899		23	97	879	95					96

NOT REPRODUCIBLE

ABERDEEN PROVING GROUND FIRINGS

F. R. No. 9708

Sheet 9 of 12

PRESSURE DATA

Date Feb. 1 & 3,
March 30 & April 1,
1937

Type of gauge Minor Cal. Army Type

Position of gauge In base of cartridge case.

Metal of crusher cylinder Jan. 19, 1924. Annealed Nov. 12 - 14, 1929

Initial compression 0

ROUND NO.	BAND DIAM. INS.	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	MEAN
1024		1197	204	23	207					206
1025		218	196	1474	207					202
1026		816	205	504	203					204
1027		500	211	847	214					213
1028		13	219	618	212					216
1029		1114	245	961	247					246
1030		1039	247	510	223					235
1031		16	237	41	243					240
1032		1023	239	24	239					239
1033		1033	239	1064	239					239
1034		1213	255	697	245					250
1035		991	251	1058	245					248
1036		962	239	1206	226					233
1037		789	264	1051	219					242
1038		1215	242	1188	245					244
1039		984	229	966	241					235
1040		1214	218	1077	209					214
1041		969	235	31	228					232
1042		919	239	1028	234					237
1043		1176	242	10	241					242
1044		953	223	313	235					229
1045		639	235	220	228					232
1046		2	243	820	235					239
1047		1210	212	503	226					219
1048		970	224	11	228					226
1049		1040	68	959	55					62
1050		42	34	1080	16					40
1051		37	77	17	77					77
1052		1076	81	22	105					93
1053		47	160	927	181					171
1054		268	191	1175	189					190
1055		880	177	1017	152					165
1056		888	193	732	177					185
1057		809	204	509	196					200
1058		132	170	511	176					173
1059		1030	174	33	186					180
1060		1047	196	922	157					177
1061		1194	172	1178	196					184

ABERDEEN PROVING GROUND FIRINGS

F.R. No. 9708

Sheet 10 of 12

Date Feb. 1 & 3,

March 30 & April 1,
1937

PRESSURE DATA

Type of gauge Minor Cal. Army Type

Position of gauge In base of cartridge case.

Metal of crusher cylinder Jan. 19, 1924. Annealed Nov. 12 - 14, 1929

Initial compression 0

ROUND NO.	BAND DIAM. INS.	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	MEAN
1063		512	170	567	186					178
1064		1041	207	979	208					208
1065		857	226	1172	208					217
1066		1046	222	36	209					216
1067		1079	224	974	214					219

Pressures in this report are read and calculated to the nearest one hundred lbs.

MISCELLANEOUS DATA

NOT REPRODUCIBLE

UNIFORMITY DATA

DATE	POWDER	CHARGE	LOAD- SRS.	PRIMER	SIGHT- GRAPH	NO. OF RDS.	MUZZLE VELOCITY - F.S.			PRESSURE - LBS.				
							MAX.	VAR.	MEAN	NO. OF RDS.	MEAN	MAX.	VAR.	
1937	LOT	QZS.	ING	ING			f.s.	%	DEV.	MEAN	lbs.	%		
Feb. 1	1848	7.3	A	49 Gr.	369	10	687	26	3.78	5.7	10	1900	14.00	73.68
"	"	"	"	"	"	10	693	21	3.07	3.9	"	"	"	"
"	"	17	B	49 Gr.	579	10	1257	15	1.19	3.7	10	22700	2600	11.45
"	"	"	"	"	"	10	1257	20	1.59	5.0	"	"	"	"
"	3671-S	6.8	C	49 Gr.	584	5	677	30	4.43	10.0	5	2600	4800	134.62
"	"	"	"	"	"	5	677	29	4.28	9.6	"	"	"	"
Feb. 3	"	"	C	49 Gr.	915	5	693	22	3.19	8.0	"	"	"	"
"	"	"	"	"	"	5	693	20	2.99	6.4	"	"	"	"
Feb. 1	1849-A	4.25	D	49 Gr.	869	5	638	17	2.66	5.8	5	1500	600	37.50
"	"	"	"	"	"	5	638	15	2.75	5.2	"	"	"	"
Feb. 1	3724-S	6.25	E	49 Gr.	699	10	696	26	3.74	6.0	10	4300	9000	269.36
"	"	"	"	"	"	10	696	26	3.88	7.0	"	"	"	"
Feb. 3	3724-S	6.25	E	49 Gr.	910	10	706	18	2.55	4.9	"	"	"	"
"	"	"	"	"	"	10	711	17	2.39	4.9	"	"	"	"
Mar. 30	3671-S	16	F	49 Gr.	1028	5	1220	25	2.05	8.0	5	20800	1400	6.75
"	"	"	"	"	"	5	1221	28	2.29	9.2	"	"	"	"
Apr. 1	3671-S	16	F	49 Gr.	1067	5	1213	37	4.70	15.4	5	20000	4100	19.71
"	"	"	"	"	"	5	1215	38	4.77	15.4	"	"	"	"
Mar. 30	3671-S	16.30	G	49 Gr.	1036	10	1252	24	1.92	6.4	10	24200	1700	7.62
"	3724-S	"	"	"	"	10	1254	23	1.63	5.1	"	"	"	"
Mar. 30	3671-S	16.30	H	49 Gr.	1048	10	1257	25	2.02	4.1	10	23100	2600	12.12
"	3724-S	"	"	"	"	10	1239	28	2.26	4.0	"	"	"	"
Mar. 30	1849A & 1849B	14.15	I	49 Gr.	1061	6	1246	21	1.69	7.7	7	18100	3500	19.33
"	"	"	"	"	"	7	1249	25	2.00	6.6	"	"	"	"

A = Charge loaded in single scrim bag 2-3/4" x 9"
 B = Charge loaded in 2 scrim bags. 7.5 cts. in 2-3/4" x 9" bag. 9.7 cts. in 3-1/2" x 10-1/2" bag.
 C = Special primer arrangement - See A.P.G. Sketch 2601 AB. 49 Gr. Primer used, with 200 grains base zone in primer body. 6.32 cts. in single scrim bag 2-3/4" x 9".
 D = Charge loaded in single scrim bag 2-3/4" x 7"
 E = Charge loaded in single scrim bag 2-3/4" x 10"
 F = Special primer arrangement - See A.P.G. Sketch 2601 AB. 49 Gr. Primer used, with 200 grains base zone in primer body. 6.32 cts. in single scrim bag 2-3/4" x 9".
 G = 6.25 cts. of Lot 3724-S in scrim bag 2-3/4" x 10".
 H = 6.25 cts. of Lot 3724-S in scrim bag 2-3/4" x 10".
 I = 4.25 cts. of Lot 1849A in single scrim bag 2-3/4" x 7". 9.00 cts. of Lot 1849B in single scrim bag 3-1/2" x 10".

MISCELLANEOUS DATA

No change in howitzer or carriage since last firing.

There were no misfires, flarebacks or evidence of unconsumed powder on any round.

Howitzer and carriages functioned satisfactorily.

Short hangfire, 1/10 sec. (Rds. 890 & 894)

Short hangfire, 1/2 sec. (Rd. 896)

.2 Sec. hangfire (Rd. 1041)

Slight hangfires on Rds. 1039, 1042, 1046 & 1047.

Large flash on Rds. 883, 888 & 912.

Very large flash on Rd. 914.

Small flash on Rds. 885 & 887.

METEOROLOGICAL DATA

DATE	TIME	BAROMETER	THERMOMETER	HUMIDITY	WIND	
					DIR.	MPH
Feb. 1	2 PM	30.07	47	49	W	10
Feb. 1	4 PM	30.07	48	44	NW	12
Feb. 3	2 PM	30.40	33	51	N	15
Mar. 30	10 AM	30.17	41	42	NW	8
Mar. 30	12 Noon	30.10	47	34	NW	10
Apr. 1	10 AM	30.16	50	33	NW	6

J. W. Hansborough
J. W. HANSBOROUGH,
 1st Lt., Ord. Dept.,
 Proof Officer.

APPROVED:

C. M. Wesson
C. M. WESSON,
 Col., Ord. Dept.,
 Commanding.

K. F. Adairson
K. F. ADAIRSON,
 Lt. Col., Ord. Dept.,
 Chief Proof Officer,
 Gun Testing Division.

PROCESSED PROJECTS REPORT

June 9 to Sept. 1

1936

106

19

Object of Project: Establishment of Charge for Different Types of Charge for 75 M/M Howitzer

DEVELOPMENT

XXXXXX Project No. KA 108

Request F. W. N.

471.5/10 Misc. 303-6 is

75 M/M Pack How.	M1	Watervliet Arsenal	3	616
75 M/M Pack How.	1023 M1	" "	2	2255
75 M/M Pack How.	T1	Rock Island Arsenal	1	
75 M/M Pack How.	T1	Rock Island Arsenal	1	
75 M/M Pack How.	M102	Rock Island Arsenal	2	267
75 M/M Pack How.		" "	2	

3" C.S. Shell, Model 147, modified to 75 M/M Proof projectile, S.A. Wood & Co. Lot 1232-1, Dr. 75-1-158

None

None

None

NOT REPRODUCIBLE

See Sheet No. 10

XXXXXX

MJ, Dr. 71-2-11

None

40 Gr. Perc. U.S.C. Lot 2072-309, Dr. 71-2-18 (Rds. 617 - 627, 630 - 727 & 2256)

Primer

Special primer (Rds. 2257 - 2262) (See Sheet 5)

40 Gr. Perc. U.S.C. Lot 2072-102, Dr. 71-2-18 (All other rounds)

GENERAL DATA BY ROUNDS

1936 DATE	ROUND NO.	TIME OF FIRING	PROJECTILE		POWDER			ELEVATION Deg. Min.	FINAL CORRECTED		
			No.	Weight as Fired lbs.	Lot	Box No.	Charge Weight Oz.		Pressure	Veloc.	
<u>Firings in 75 M/M Pack Howitzer, M1, No. 3, Mfr. Watervliet Arsenal</u>											
June	9	617	11:29	15		EX 1847		4.5	2	15	
		618	11:31	"		" "		7.5	"	"	2300
		619	11:34	"		" "		"	"	"	2900
		620	11:50	"		" "		12.0	"	"	7200
		621	11:52	"		" "		"	"	"	8900
		622	1:15	"		" "		16.0	"	"	17400
		623	1:18	"		" "		"	"	"	16400
		624	2:12	"		" "		16.6	"	"	19300
		625	2:15	"		" "		"	"	"	20200
		626	2:19	"		" "		"	"	"	19200
	627	2:21	"		" "		17.43	"	"	21000	
11	628	9:35	"		EX 1843		5.0	2	10		
	629	9:40	"		" "		7.5	"	"	2000	
	630	9:42	"		" "		"	"	"	1500	
	631	9:53	"		" "		12	"	"	9700	
	632	9:55	"		" "		"	"	"	8800	
	633	10:07	"		" "		16.4	"	"	21000	
	634	10:10	"		" "		"	"	"	21500	
	635	10:25	"		" "		17.0	"	"	24000	
	636	10:28	"		" "		"	"	"	22900	
	637	10:35	"		" "		17.85	"	"	26100	
12	638	9:38	"		" "		7.5	2	15		
	639	9:41	"		" "		17.0	"	"	23400	
	640	9:43	"		" "		"	"	"	25000	
	641	9:45	"		" "		"	"	"	22700	
15	642	9:06	"		EX 1850		8.0	"	"		
	643	9:09	"		" "		10.0	"	"	10800	
	644	9:12	"		" "		"	"	"	10000	
	645	9:30	"		" "		13.0	"	"	16900	
	646	9:31	"		" "		"	"	"	16000	

NOT REPRODUCIBLE

GENERAL DATA BY ROUNDS

1936 DATE	ROUND NO.	TIME OF FIRING	PROJECTILE			POWDER			ELEVATION Feet	FINAL CORRECTED	
			No.	WEIGHT OF FINED LBS.		Lot	Box No.	CHARGE WEIGHT LBS.		PRESSURE	VELOCITY
June											
			firings in 7 1/2 inch Pack Howitzer, M1, No. 3, Mfr. Watervliet Arsenal								
	15	647 9:41		15		EX 1850		11.6	2 15	22100	1289
		648 9:45		"		" "		"	" "	23000	1301
		649 9:57		"		" "		11	" "	21500	1252
		650 9:59		"		" "		"	" "	20700	1256
		651 10:01		"		" "		"	" "	20800	1254
	16	652 11:08		"		See remarks		12	2 8		947
		653 11:10		"		" "		"	" "	8300	982
		654 11:13		"		" "		"	" "	8200	985
		655 11:30		"		" "		16	" "	16200	1166
		656 11:33		"		" "		"	" "	17000	1174
		657 11:40		"		" "		18.6	" "	20500	1263
		658 11:51		"		" "		"	" "	20700	1287
	29	659 9:44		"		" "		8.0	2 13		859
		660 9:46		"		" "		"	" "	1300	870
		661 9:49		"		" "		"	" "	1300	870
		662 10:06		"		" "		12.0	" "	11600	1084
		663 10:10		"		" "		"	" "	12300	1094
		664 10:35		"		" "		14.0	" "	14700	1180
		665 10:37		"		" "		"	" "	17200	1210
		666 10:55		"		" "		15.0	" "	18200	1243
		667 10:58		"		" "		"	" "	15600	1278
Aug.											
25	698	2:03		"		" "		8.25	2 0		1017
	699	2:07		"		" "		11.25	" "	15600	1134
	700	2:09		"		" "		"	" "	15600	1140
	701	2:16		"		" "		13.25	" "	21300	1249
	702	2:17		"		" "		"	" "	20600	1254
	703	2:21		"		" "		"	" "	20800	1236
	704	2:33		"		" "		"	" "	21900	1268
	705	3:10		"		3727-S		5	" "		775
	706	3:11		"		"		5	" "		
	707	3:14		"		"		5	" "	2400	680
	708	3:16		"		"		5	" "	2900	681

NOT REPRODUCIBLE

GENERAL DATA BY ROUNDS

1936 DATE	ROUND NO.	TIME OF FIRING	PROJECTILE		POWDER			ELEVATION		FINAL CORRECTED		
			No.	WEIGHT AS FIRING LOG.	Lot	Box No.	CHARGE WEIGHT OZS.	Deg.	Min.	PRESSURE	FOUL VELOCITY	
Firings in 75 M/M Pack Howitzer, M1, No. 3, Mfr. Watervliet Arsenal												
Aug.	25	709	3:27	15	3727-S		6	2	0	6000	755	
		710	3:29	"	"		"	"	"	4700	761	
		711	3:48	"	See remarks		8.0	"	"	7000	819	
		712	3:50	"	"		"	"	"	6500	820	
		713	3:51	"	"	"	10.0	"	"	11600	957	
		714	3:53	"	"	"	"	"	"	12900	956	
	Sept. 3		715	2:09	"	"		8.0	1	33		845
			716	2:12	"	"		14.0	"	"	21700	1162
			717	2:20	"	"		"	"	"	23200	1173
			718	2:40	"	"		15.0	"	"	26700	1214
			719	2:42	"	"		"	"	"	24600	1216
			720	3:11	"	"	3536	5	1	37	1800	657
			721	3:10	"	"	"	"	"	"	2000	672
			722	3:18	"	"	"	6	"	"	4300	727
		723	3:19	"	"	"	"	"	"	4000	722	
		724	3:41	"	See remarks		12.0	"	"	14700	1044	
		725	3:42	"	"		"	"	"	14300	1042	
		726	3:44	"	"	"	14.0	"	"	20100	1145	
		727	3:48	"	"	"	"	"	"	20000	1136	
21			728	9:54	"	"		12.0	2	15		1160
		729	10:00	"	"		16.0	"	"	26700	1241	
		730	10:02	"	"		"	"	"	25700	1233	
		731	10:31	"	"	3724-S	5	"	"		619	
		732	10:33	"	"	"	"	"	"		619	
		733	10:35	"	"	"	7	"	"		760	
		734	10:37	"	"	"	"	"	"		746	
		735	11:01	"	See remarks		13.0	"	"	15000	1064	
		736	11:03	"	"		"	"	"	14400	1064	
		737	11:05	"	"	"	15.0	"	"	21500	1174	
		738	11:06	"	"	"	"	"	"	20900	1173	
	739	1:40	"	"	"	13.0	"	"		1195		

GENERAL DATA BY ROUNDS

1936 DATE	ROUND NO.	TIME OF FIRING	PROJECTILE		POWDER			ELEVATION		FINAL CORRECTED	
			No.	WEIGHT AS FIRED lbs.	Lot	Box No.	CHARGE WEIGHT OZS.	Deg.	Min.	Pressure	Veloc. ft./Sec.
Sept.											
<u>Firings in 75 M/M Pack Howitzer, M1, No. 3, Mfr. Watervliet Arsenal</u>											
21	740	1:50		15	See remarks		16.5	2	15	24500	1261
	741	1:52		"	" "		"	"	"	27100	1275
	742	2:17		"	" "		16.3	"	"	24300	1238
	743	2:18		"	" "		"	"	"	26300	1253
	744	2:22		"	" "		"	"	"	26100	1244
	<u>Firings in 75 M/M Pack Howitzer, M1923 El, No. 2, Mfr. Watervliet Arsenal</u>										
June											
15	2256	1:15		15	3671-S		7	2	8		644
	2257	1:19		"	"		6.11	"	"		647
	2258	1:26		"	"		"	"	"		646
	2259	1:35		"	"		"	"	"		649
	2260	2:30		"	"		15.25	"	"		1181
	2261	2:41		"	"		"	"	"	19000	1176
	2262	2:47		"	"		"	"	"	19600	1173

Rds. 617 to 651, 705-710, 720-723, 731-734, 2256 - 2262 incl. charge made up in one scrim bag.

Rds. 652 to 658 incl. charge made up with 200 grains of Hercules T.M. Powder Lot 3738 in scrim bag 4" long. Remainder of charge made up with D.P. Powder Lot 1901-B in separate bags.

Rds. 659 to 667 incl. charge made up with 4.25 ozs. of experimental powder Lot 1849A in first zone bag. Remainder of charge made up with Powder Lot 1847 in separate bags.

Rds. 698 to 704 incl. charge made up with 4.25 ozs. of powder Lot 1849A in first zone bag. Remainder of charge made up with powder Lot 1250 in separate bags.

Rds. 711 to 719 incl. charge made up with 5.25 ozs. of Powder Lot 3727 in one scrim bag. Remainder of charge made up with Powder Lot 3671-S in separate bags.

Rds. 724 to 730 incl. charge made up with 5.70 ozs. of Powder Lot 3636 in one scrim bag. Remainder of charge made up with Powder Lot 367S in separate scrim bags.

Rds. 735 to 744 incl. charge made up with 6.25 ozs. of Powder Lot 3724-S in one scrim bag. Remainder of charge made up with Powder Lot 3671-S in separate scrim bags.

Rds. 2257 to 2262 incl. Special Primer 2081 BS with 200 grains of smokeless powder inside primer case.

VELOCITY DATA

Cannon 75 M/M Paok How. #3, M1

Fired by Lt. H.A. Quinn

on June 9 to Sept. 21, 1932

ROUND NO.	TIME OF FIRING	FORM FACTOR	BOULENGÉ			SOLENOID			
			- CHRONOGRAPH NUMBER			MEAN INSTRUMENTAL	MUSKET VELOCITY	INSTRUMENTAL	MUSKET VELOCITY
			1947	1339	1305				
			GUN TO FIRST	HORIZONTAL	CORRECTED TO	BETWEEN	HORIZONTAL	CORRECTED TO	
			Coil.....			Coil.....			
			Screen.....			Screen.....			
617	11:29	1 - 1.01	Marks off rod						
618	11:31		721	723	No mark on rod	722	724		
619	11:34		723	724	725	724	726		
620	11:50		No mark on rod			976	979		
621	11:52		1005	1003	1005	1004	1007		
622	1:15		No mark on rod			1230	1232		
623	1:18		1216	1222	1225	1221	1227		
624	2:12		1275	1280	1282	1279	1286		
625	2:15		1294	1300	1298	1297	1304		
626	2:19		1282	1285	1291	1286	1293		
627	2:21		1319	1329	1327	1325	1332		
628	9:35		Missed second screen						
629	9:40		717	718	718	718	720		
630	9:42		713	714	715	714	716		
631	9:53		985	987	983	985	988		
632	9:55		976	979	979	978	981		
633	10:07		1207	1217	1217	1214	1220		
634	10:10		1210	1217	1213	1213	1219		
635	10:25		1250	1254	1254	1253	1259		
636	10:28		1253	1250	1250	1251	1257		
637	10:35		1287	1292	1292	1290	1297		
638	9:38		691	693	693	692	694		
639	9:41		1241	1246	1246	1244	1250		
640	9:43		1240	1240	1237	1239	1245		
641	9:45		1262	1257	1257	1259	1265		
642	9:06		868	874	874	872	874		
643	9:09		1035	1031	1030	1032	1035		
644	9:12		1017	1017	1016	1017	1020		

VELOCITY DATA

Cannon 75 M/M Pack How. #3, M1 Fired by Lt. H. A. Quinn on

Screen Distances	GUN TO FIRST	HORIZONTAL	CORRECTED TO	BETWEEN	HORIZONTAL	CORRECTED TO
	Coil			Coil		
	Screen			Screen		

ROUND NO.	TIME OF FIRING	FORM FACTOR	BOULENGÉ					SOLENOID	
			CHRONOGRAPH NUMBER			MEAN INSTRUMENTAL	MUZZLE VELOCITY	INSTRUMENTAL	MUZZLE VELOCITY
			1947	1339	1305				
645	9:30	1 - 1.01	1180	1184	1184	1183	1183		
646	9:31		1188	1190	1168	1189	1194		
647	9:41		1279	1283	1285	1282	1289		
648	9:45		1299	1291	1293	1294	1301		
649	9:57		1246	1247	1246	1246	1252		
650	9:59		1253	1248	1248	1250	1256		
651	10:01		1250	1248	1247	1248	1254		
652	11:08		944	947	945	945	947		
653	11:10		982	981	978	980	982		
654	11:13		982	982	985	983	985		
655	11:30		1158	1164	1160	1161	1166		
656	11:33		1165	1173	1168	1169	1174		
657	11:49		1251	1259	1261	1257	1263		
658	11:51		1278	1284	1281	1281	1287		
659	9:44	1 - 1.16	856	856	858	857	899		
660	9:46		868	869	867	868	870		
661	9:49		867	870	868	868	870		
662	10:06		1079	1086	1078	1081	1085		
663	10:10		1090	1092	1088	1090	1094		
664	10:35		1170	1179	1173	1174	1180		
665	10:37		1203	1203	1202	1202	1210		
666	10:55		1235	1237	1234	1236	1243		
667	10:58		1270	1274	1268	1271	1278		
698	2:03		1014	1015 1015	1014	1014	1017		
699	2:07		1129	1133	1129	1130	1134		
700	2:09		1134	1139	1134	1136	1140		
701	2:16		1242	1248	1242	1244	1249		
702	2:17		1249	1251	1248	1249	1254		
703	2:31		1227	1234	1231	1231	1236		
704	2:33		1261	1265	1261	1262	1268		

VELOCITY DATA

Cannon 75 M/H Pack How. #3, M1 Fired by Lt. H.A. Quinn on

Screen Distances	GUN TO FIRST	HORIZONTAL	CORRECTED TO	BETWEEN	HORIZONTAL	CORRECTED TO
	Coil				Coil	
Screen				Screen		

ROUND NO.	TIME OF FIRING	FORM FACTOR	BOULENGÉ				SOLENOID		
			CHRONOGRAPH NUMBER			MEAN INSTRUMENTAL	MUZZLE VELOCITY	INSTRUMENTAL	MUZZLE VELOCITY
			1947	1335	1305				
705	3:10	1 - 1.16	772	774	772	773	775		
706	3:11		-----No marks on rod-----						
707	3:14		678	680	678	679	680		
708	3:16		680	681	679	680	681		
709	3:27		763	764	763	763	765		
710	3:29		759	760	759	759	761		
711	3:48		846	848	846	847	849		
712	3:50		847	848	846	847	849		
713	3:51		953	955	953	954	957		
714	3:53		952	954	*	953	956		
715	2:09	1 - 1.01	841	843	841	842	845		
716	2:12		1156	1157	1156	1156	1162		
717	2:20		1167	1169	1166	1167	1173		
718	2:40		1205	1208	1207	1207	1214		
719	2:42		1208	1208	1211	1209	1216		
720	3:11		656	656	656	656	657		
721	3:16		640	641	640	640	641		
722	3:18		726	724	726	725	726		
723	3:19		721	719	721	720	721		
724	3:41		1039	1040	1040	1040	1044		
725	3:42		1038	1038	1038	1038	1042		
726	3:44		1140	1139	1139	1139	1145		
727	3:48		1131	1128	1131	1130	1136		
728	9:54		<u>1335</u> 1156	<u>1941</u> 1155	<u>1942</u> 1155	1155	1160		
729	10:00		1237	1234	1234	1235	1241		
730	10:02		1234	1231	1231	1232	1236		
731	10:31		618	618	618	618	619		
732	10:33		618	619	618	618	619		

VELOCITY DATA

Cannon 75 M/M Pack How.#3,M1

Fired by Lt. H.A. Quinn on

Screen Distances	GUN TO FIRST	HORIZONTAL	CORRECTED TO	BETWEEN	HORIZONTAL	CORRECTED TO
	Coil.....			Coil.....		
	Screen.....			Screen.....		

ROUND NO.	TIME OF FIRING	FORM FACTOR	BOULENGÉ					SOLENOID	
			CHRONOGRAPH NUMBER			MEAN INSTRUMENTAL	MUZZLE VELOCITY	INSTRUMENTAL	MUZZLE VELOCITY
			1335	1941	1942				
733	10:35	1 - 1.01	759	758	757	758	760		
734	10:37		744	744	743	744	746		
735	11:01		1061	1063	1060	1061	1064		
736	11:03		1083	1079	1080	1081	1084		
737	11:05		1171	1168	1168	1169	1174		
738	11:06		1170	1168	1167	1168	1173		
739	1:48		1188	1190	1187	1188	1193		
740	1:50		1253	1260	1253	1255	1261		
741	1:52		1265	1271	1270	1269	1275		
742	2:17		1233	1228	1234	1232	1238		
743	2:18		1245	1245	1251	1247	1253		
744	2:22		1236	1239	1239	1238	1244		

Firings in 75 M/M Pack Howitzer, M1923 L1, No. 2

ROUND NO.	TIME OF FIRING	FORM FACTOR	1947	1339	1305	MEAN INSTRUMENTAL	MUZZLE VELOCITY
			662	662	661		
2256	1:09	1 - 1.01				662	664
2257	1:19		647	645	644	645	647
2258	1:26		644	643	644	644	646
2259	1:35		648	647	647	647	649
2260	2:30		1177	1177	1173	1176	1181
2261	2:41		1170	1174	1174	1173	1178
2262	2:47		1167	1168	1170	1168	1173

Boulengé Screen - Ft.

Howitzer	Date	Horizontal		Corrected to		
		Gun to 1st	Between	Elev. Deg. Min.	Gun to 1st	Between
No. 3	June 9	31.93'	89.68'	2 15	31.96'	89.75'
" "	" 11	32.59'	89.81'	2 19	32.59'	89.81'
" "	" 12	36.69'	89.85'	2 15	36.69'	89.92'
" "	" 15	32.61'	89.83'	2 15	32.64'	89.90'
" "	" 16	32.58'	89.83'	2 8	32.61'	89.89'
" "	" 29	32.47'	94.04'			
" "	Aug. 25	31.93' *	60.68' *			
" "	Sept. 3	31.93'	120.42'			
" "	Sept. 21	32.55'	61.17'			
No. 2	June 15	32.68'	89.82'	2 8	32.70'	89.88'

* = Inclined.

ABERDEEN PROVING GROUND FIRINGS

F. R. No. 9106
 Sheet 10 of 19
 Date June 9 to
 Sept. 21, 1936

PRESSURE DATA

Type of gauge Minor Caliber. Army Type.
 Position of gauge In base of cartridge case.
 Metal of crusher cylinder Jan. 19, 1924. Annealed Nov. 12-14, 1929.
 Initial compression 0

ROUND NO.	BAND DIAM. INS.	CRUSHER NO.	CRUSHER NO.	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	MEAN
90° Apart										
Firings in 75 M Pack Howitzer, M1, No. 3, Mfr. Watervliet Arsenal										
617	3.009	3.010								
618	3.010	3.009		504	20	1215	26			23
619	3.008	3.007		639	32	966	25			29
620	3.009	3.010		311	72	501	72			72
621	3.011	3.011		879	93	1207	85			89
622	3.006	3.008		1206	166	509	181			174
623	3.010	3.009		857	160	31	167			164
624	3.008	3.007		1002	189	24	196			193
625	3.008	3.009		1019	193	268	210			202
626	3.005	3.008		1038	195	47	188			192
627	3.009	3.009		259	214	1041	206			210
628	3.009	3.011								
629	3.010	3.011		949	18	888	22			20
630	3.008	3.009		1032	11	13	18			15
631	3.008	3.008		33	93	965	100			97
632	3.008	3.008		919	87	1047	89			88
633	3.009	3.008		840	218	1221	202			210
634	3.008	3.010		6	212	1214	218			215
635	3.006	3.008		876	244	1069	236			240
636	3.009	3.010		1113	223	1031	235			229
637	3.008	3.007		828	266	815	256			261
638	3.009	3.010								
639	3.010	3.011		824	234	10	233			234
640	3.009	3.010		974	231	951	228			230
641	3.009	3.008		936	225	1178	228			227
642	3.009	3.010								
643	3.009	3.011		981	108	521	107			108
644	3.011	3.010		1195	101	1052	99			100

ABERDEEN PROVING GROUND FIRINGS

F. R. No. 9106
 Sheet 11 of 19
 Date June 9 to
 Sept. 21, 1936

PRESSURE DATA

Type of gauge
 Position of gauge
 Metal of crusher cylinder
 Initial compression

ROUND NO.	BAND DIAM. INS.	CRUSHER SIZE	CRUSHER SIZE	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	MEAN
	90° Apart									
Firings in 75 M/M Pack Howitzer, M1, No. 3, Mfr. Watervliet Arsenal										
645	3.010	3.009		984	170	313	167			169
646	3.009	3.008		217	150	20	170			160
647	3.008	3.009		489	221	7	220			221
648	3.010	3.009		567	225	754	235			230
649	3.011	3.010		42	206	1176	224			215
650	3.011	3.010		246	203	1079	211			207
651	3.010	3.010		17	201	1073	215			208
652	3.011	3.011								
653	3.009	3.009			90		75			83
654	3.009	3.008			73		91			82
655	3.010	3.009			161		162			162
656	3.007	3.009			172		168			170
657	3.011	3.010			204		206			205
658	3.011	3.011			201		212			207
660					47		35			41
661					48		38			43
662					121		110			116
663					116		129			123
664					156		137			147
665					165		178			172
666					182		182			182
667					153		159			156
699				33	153	857	159			156
700				311	161	1019	150			156
701				10	206	268	219			213
702				509	205	349	206			206
703				1031	203	1058	212			208
704				639	221	965	216			219

ABERDEEN PROVING GROUND FIRINGS

F. R. No. 9106
 Sheet 12 of 19
 Date June 9 to
 Sept. 21, 1936

PRESSURE DATA

Type of gauge
 Position of gauge
 Metal of crusher cylinder
 Initial compression

ROUND NO.	BAND DIAM. INS.	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	MEAN
Firings in 75 M Pack Howitzer, M1, No. 3, Mfr. Watervliet Arsenal										
706				828		1214				
707				13	29	501	18			24
708				47	28	919	29			29
709				1215	61	876	59			60
710				1032	41	888	52			47
711				1207	68	31	73			70
712				879	87	1221	85			86
713				974	118	1041	114			116
714				951	131	840	126			129
716					205		228			217
717					235		228			232
718					255		278			267
719					256		235			246
720					18		18			18
721					11		29			20
722					44		41			43
723					44		36			40
724					157		137			147
725					148		137			143
726					196		205			201
727					198		201			200
729				1079	267	1064	266			267
730				502	262	1219	251			257
735				567	145	521	155			150
736				1175	152	217	135			144
737				37	218	17	212			215
738				489	199	921	218			209
740				809	254	1213	236			245

ABERDEEN PROVING GROUND FIRINGS

F. R. No. 9106
 Sheet 13 of 19
 Date June 9 to
 Sept. 21, 1936

PRESSURE DATA

Type of gauge
 Position of gauge
 Metal of crusher cylinder
 Initial compression

ROUND NO.	BAND DIAM. INS.	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	GAUGE NO.	PRESSURE 100	MEAN
<u>Firings in 75 M/M Pack Howitzer, M1. No. 3, Mfr. Watervliet Arsenal</u>										
741				1030	270	20	272			271
742				842	242	16	244			243
743				41	252	627	274			263
744				1011	275	11	247			261
<u>Firings in 75 M/M Pack Howitzer, M1923 E1, No. 2, Mfr. Watervliet Arsenal</u>										
2261				1175	181	970	199			190
2262				1064	188	1219	203			196

Pressures in this report are read and calculated to the nearest one hundred lbs.

ABERDEEN PROVING GROUND FIRINGS

F. R. No. 9106
 Sheet 14 of 19
 Date June 9 to
 Sept. 21, 1936

POWDER (TEST) DATA

Method of determining erosion correction **No correction made.**
 Temperature of powder Hours in constant temperature magazine
 Amount of correction in velocity at service velocity f. s.
 Amount of correction in pressure at service velocity pounds per square inch

ROUND NO.	FLASH		SMOKE		VALUES CORRECTED TO PROJECTILE WEIGHT		
	SIZE	COLOR	AMOUNT	COLOR	VELOCITY		PRESSURE
					Reul.	Sol.	
<u>Firings in 75 M/M Pack Howitzer, M1, No. 3, Mfr. Watervliet Arsenal</u>							
618		None	Little	Gray	724		2300
619	Large		None		726		2900
620		Flashed			979		7200
621					1007		8900
622					1232		17400
623					1227		16400
624		None			1286		19300
625	Large				1304		20200
626		Flashed			1293		19200
627	Large				1332		21000
629		None	Some	Gray	720		2000
630		"	"	"	716		1500
631		"	"	"	988		9700
632		"	"	"	981		8800
633			Large	"	1220		21000
634			"	"	1219		21500
635			"	"	1259		24000
636					1257		22900
637					1297		26100
638					694		
639			Large	Gray	1250		23400
640			"	"	1245		23000
641			"	"	1265		22700
642	Large	Yellow		None	874		
643	Small		Small	Gray	1035		10800
644	Large	Yellow			1020		10000
645	"	"			1188		16900
646	"	"			1194		16000

POWDER (TEST) DATA

Method of determining erosion correction **No correction made.**

Temperature of powder Hours in constant temperature magazine

Amount of correction in velocity at service velocity f. s.

Amount of correction in pressure at service velocity pounds per square inch

ROUND NO.	FLASH		SMOKE		VALUES CORRECTED TO PROJECTILE WEIGHT		
	SIZE	COLOR	AMOUNT	COLOR	VELOCITY		PRESSURE
					Boil.	S.L.	
<u>Firings in 75 M/M Pack Howitzer, M1, No. 3, Mfr. Watervliet Arsenal</u>							
647					1269		22100
648					1301		23000
649					1252		21500
650					1256		20700
651					1254		20800
652	Large	Yellow			947		
653		None			982		8300
654	Large	Yellow			985		8200
655	"	"			1166		16200
656					1174		17000
657					1263		20500
658					1287		20700
659		Flash			859		
660		"			870		4100
661		None			870		4300
662	Large				1084		11600
663	"				1094		12300
664	"				1180		14700
665	"				1210		17200
666					1243		18200
667					1278		15600
698					1017		
699	Small				1134		15600
700	"				1140		15600
701	Large				1249		21300
702	"				1254		20600
703	"				1236		20800
704	"				1268		21900

POWDER (TEST) DATA

Method of determining erosion correction **No correction made.**
 Temperature of powder Hours in constant temperature magazine
 Amount of correction in velocity at service velocity f. s.
 Amount of correction in pressure at service velocity pounds per square inch

ROUND NO.	FLASH		SMOKE		VALUES CORRECTED TO PROJECTILE WEIGHT		
	SIZE	COLOR	AMOUNT	COLOR	VELOCITY		PRESSURE
					Ball.	Sol.	
<u>Firings in 75 M/M Pack Nowitzer, M1, No. 3, Mfr. Watervliet Arsenal</u>							
705		None			775		
706		"					
707		"			680		2400
708		"			681		2900
709					765		6000
710					761		4700
711					849		7000
712					849		8000
713		None			957		11600
714		Flashed			956		12900
715					845		
716		None			1162		21700
717		"			1173		23200
718					1214		26700
719					1216		24600
720					657		1800
721					641		2000
722					727		4300
723					722		4000
724					1014		14700
725					1042		14300
726					1145		20100
727					1136		20000
728					1160		
729					1241		26700
730					1238		25700

NOT REPRODUCIBLE

ABERDEEN PROVING GROUND FIRINGS

F. R. No. 9106
 Sheet 17 of 19
 Date June 9 to
 Sept. 21, 1936

POWDER (TEST) DATA

Method of determining erosion correction **No correction made.**
 Temperature of powder Hours in constant temperature magazine
 Amount of correction in velocity at service velocity f. s.
 Amount of correction in pressure at service velocity pounds per square inch

ROUND NO.	FLASH		SMOKE		VALUES CORRECTED TO PROJECTILE WEIGHT		
	SIZE	COLOR	AMOUNT	COLOR	VELOCITY		PRESSURE
					Head.	Sh.	
<u>Firings in 75 M/M Pack Howitzer, M1, No. 3, Mfr. Watervliet Arsenal</u>							
731					619		
732					619		
733					760		
734					746		
735		Flashed			1064		15000
736		None			1084		14400
737					1174		21500
738					1173		20900
739					1193		
740					1261		24500
741					1275		27100
742					1238		24300
743					1253		26300
744					1244		26100
<u>Firings in 75 M/M Pack Howitzer, M1923 B1, No. 2, Mfr. Watervliet Arsenal</u>							
2256					664		
2257			Large	Gray	647		
2258			"	"	646		
2259			"	"	649		
2260			"	"	1181		
2261					1178		19000
2262					1173		19600

NOT REPRODUCIBLE

MISCELLANEOUS DATA

Description of Powder				
Powder Lot	Mfr.	Grain Form	Web Thickness	Composition
EX 1847	P.A.	Flake (Strip)	.058	N.C. - 59% N.G. - 40% D-am. - 1%
EX 1848	P.A.	S.P.	.0229	N.C. - 85% D.T. - 10% Dibut. - 5% P.N. - 1.5% D-am. - 1.0%
EX 1850	P.A.	S.P.	.0464	N.C. - 59% N.G. - 40% D-am. - 1%
1901-B	D.P.	M.P.	.0234	Pyro
EX 1849A	P.A.	M.P.	.0268	N.C. - 59% N.G. - 40% D-am. - 1%
X-3727-S	D.P.	S.P.	.0129	Nitrocellulose - 87.00 D.N.T. & D.B.P. - 13.00 (D.N.T. - 10%) (D.B.P. - 3%) Diphenylamine added - 1.00
X-3671-S	D.P.	S.P.	.0221	Nitrocellulose - 83.82 D.N.T. & D.B.P. - 14.94 Diphenylamine - 0.90 Moist. & Vols. - .34
X-3636	D.P.	S.P.	.0143	N.C. - 83.72 Diph. - .90 D.N.T. & D.B.P. - 14.87 Moisture - .51
X-3724-S	D.P.	S.P.	.0167	Nitrocellulose - 85.00 D.N.T. & D.B.P. - 15.00 (D.N.T. - 10%) (D.B.P. - 5%) Diphenylamine added - 1.00

NOT REPRODUCIBLE

MISCELLANEOUS DATA

No change in howitzers or carriages since last firing.

There were no hangfires, misfires, flarebacks or evidence of unconsumed powder except as noted.

Rd. 2256, some unburned powder.

Rd. 2257, some unburned powder in gun.

Rds. 2258 & 2259, unburned powder.

Wads used on Rds. 2257 - 2259.

Charge for first two zones arranged as in A.P.G. Drg. 2601-AB.

This firing is in connection with Project No. KR 168, to obtain a charge or a combination of charges that will give good uniformity in both the first and fourth zones of the 75 M/M Howitzer. The firings to date have included special powders and combinations of fast and slow powders. None of the charges shown in these firings have been entirely satisfactory.

NOT REPRODUCIBLE

METEOROLOGICAL DATA

DATE	TIME	BAROMETER	THERMOMETER	HUMIDITY	WIND DIR. MPH
June 9th	12 Noon	30.07	75	66	E 8
" "	2 PM	30.05	78	60	NE 8
" 11th	10 AM	29.94	76	83	SW 11
" 12th	10 AM	30.00	72	73	E 12
" 15th	10 AM	29.82	73	68	NE 8
" "	2 PM	29.77	80	52	N 15
" 16th	12 Noon	29.80	76	51	N 15
" 29th	10 AM	29.79	73	44	W 15
Aug. 25th	2 PM	29.82	92	54	S 12
" "	4 PM	29.79	93	52	SW 14
Sept. 3rd	2 PM	29.91	77	57	SE 3
" "	4 PM	29.91	75	64	S 3
Sept. 21st	10 AM	30.08	71	95	Calm
" "	12 Noon	30.08	73	91	NE 2
" "	2 PM	30.05	78	63	SE 9

H. A. QUINN,
 1st Lt., Ord. Dept.,
 Proof Officer.

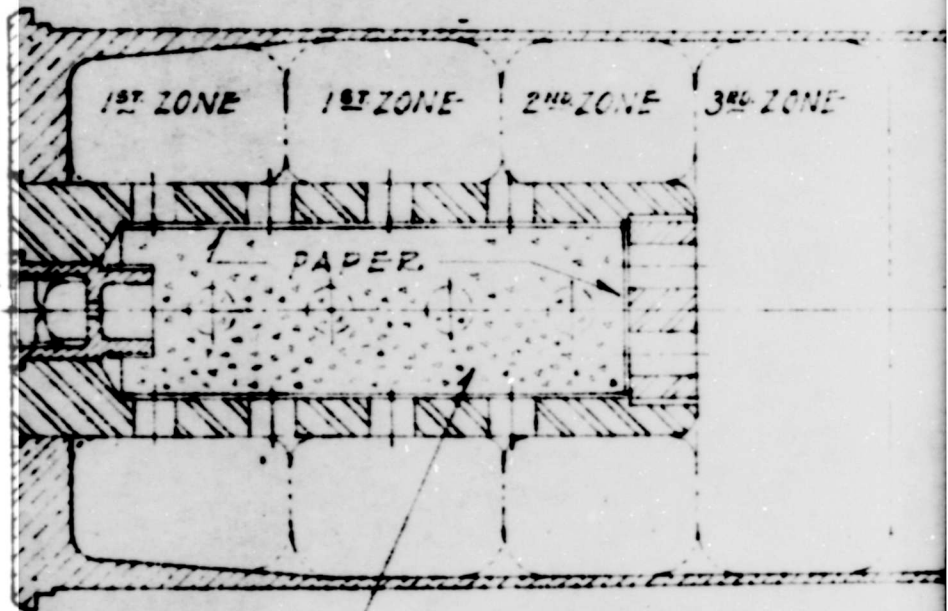
K. F. ADAMSON,
 Lt. Col., Ord. Dept.,
 Chief Proof Officer,
 Gun Testing Division.

APPROVED:

C. M. WASSON,
 Col., Ord. Dept.,
 Commanding.

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PERCUSSION PRIMER M22
HEAD, SEE DRG. 74-2-36



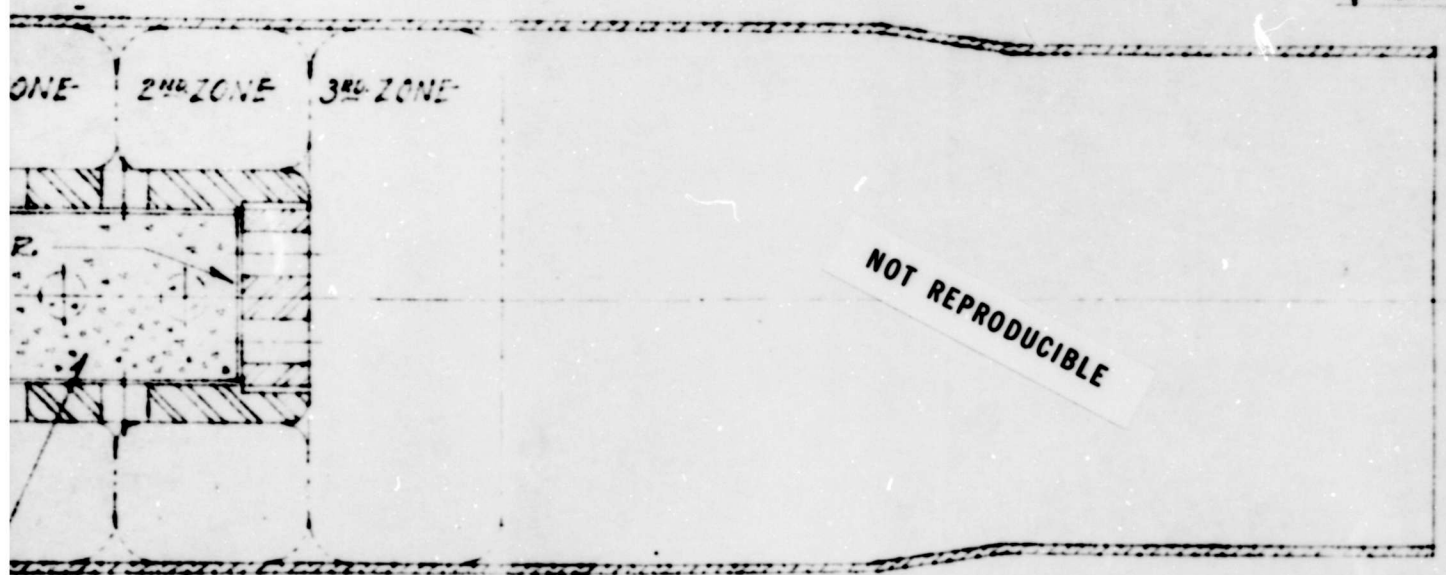
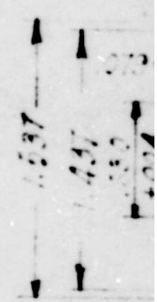
200 GRAINS SMOKELESS POWD

ASSEMBLY

A



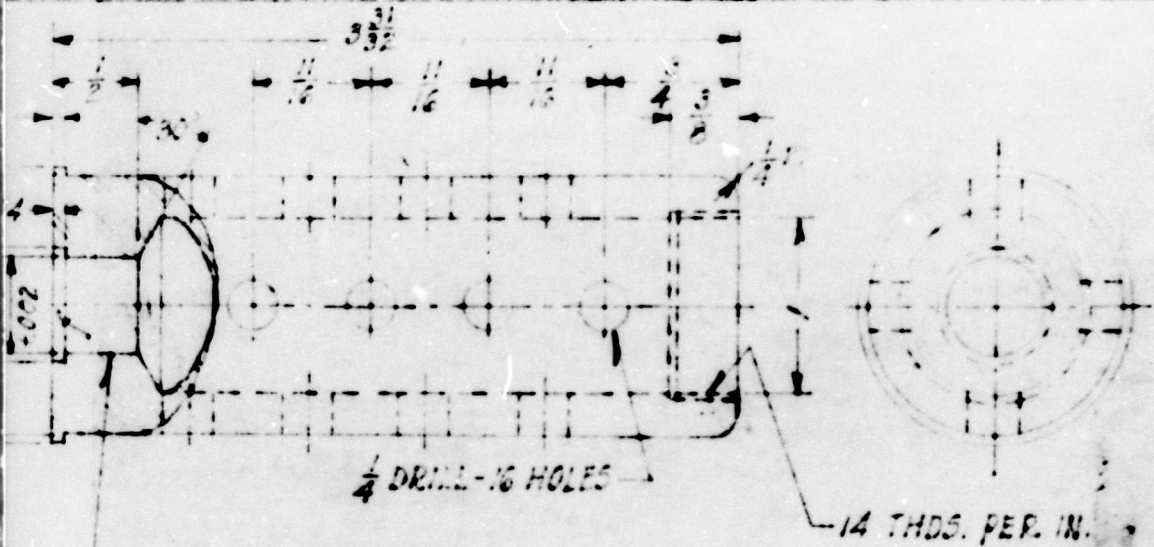
CLOSING PLUG
ONE-STEEL



NOT REPRODUCIBLE

-200 GRAINS SMOKELESS POWDER

ASSEMBLY



CONTAINER.
ONE STEEL

FINISH REAM AND TAPER .002 INCH OF DIA
PER INCH OF LENGTH.

CARTRIDGE CASE, EXPERIMENTAL
FOR 75 % PACK HOWITZER MOD. 1923

SCALE = $\frac{1}{1}$

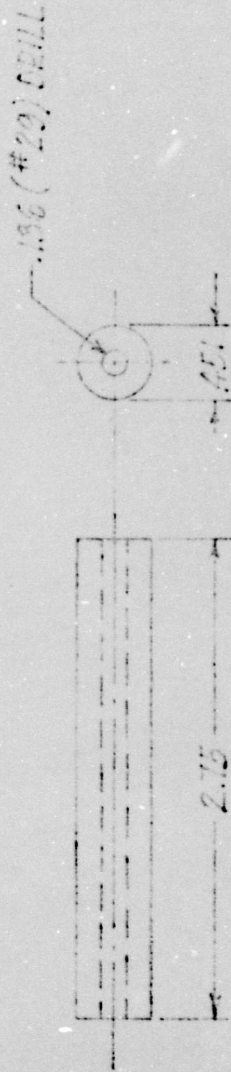
ENGINEERING SECTION
ABERDEEN PROVING GROUND MARCH 3, 1936

264.
E
2601-AB

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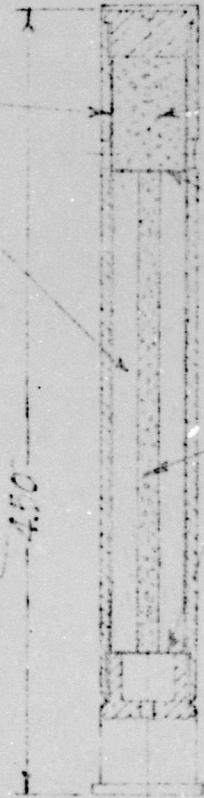
US

NOT REPRODUCIBLE



WOOD FILLER

FOILING PAPER



10 GRAINS A1 BLACK POWDER

3 GRAINS A4 BLACK POWDER

TISSUE TAPE GLUED OVER BOTH ENDS OF FILLER.

MODIFIED M22 PRIMER
FOR 75 $\frac{1}{4}$ PAK HONITZER

NOTE: FOR DRAWING OF PRIMER SEE
ORD. DIV. CLASS 74-CHK 2-DWG. 35

SCALE $\frac{1}{4}$

ENGINEERING SECTION
AERIAL PHOTOGRAPHY DIVISION
2621-D