

UNCLASSIFIED

AD NUMBER	
AD128688	
CLASSIFICATION CHANGES	
TO:	unclassified
FROM:	confidential
LIMITATION CHANGES	
TO:	Approved for public release, distribution unlimited
FROM:	Distribution authorized to U.S. Gov't. agencies and their contractors; Administrative/Operational Use; APR 1957. Other requests shall be referred to US Naval Proving Ground, Dahlgren, VA.
AUTHORITY	
30 Apr 1969 per DoDD 5200.10; USNSWC notice dtd 7 Aug 1981	

THIS PAGE IS UNCLASSIFIED

THIS REPORT HAS BEEN DELIMITED
AND CLEARED FOR PUBLIC RELEASE
UNDER DOD DIRECTIVE 5200.20 AND
NO RESTRICTIONS ARE IMPOSED UPON
ITS USE AND DISCLOSURE.

DISTRIBUTION STATEMENT A

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED.

UNCLASSIFIED

AD _____

DEFENSE DOCUMENTATION CENTER

FOR

SCIENTIFIC AND TECHNICAL INFORMATION

CAMERON STATION ALEXANDRIA, VIRGINIA

DOWNGRADED AT 3 YEAR INTERVALS:

DECLASSIFIED AFTER 12 YEARS

DOD DIR 5200.10



UNCLASSIFIED

AT 128 688

Armed Services Technical Information Agency

Reproduced by

DOCUMENT SERVICE CENTER

KNOTT BUILDING, DAYTON, 2, OHIO

This document is the property of the United States Government. It is furnished for the duration of the contract and shall be returned when no longer required, or upon recall by ASTIA to the following address: Armed Services Technical Information Agency, Document Service Center, Knott Building, Dayton 2, Ohio.

NOTICE: WHEN GOVERNMENT OR OTHER DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE U. S. GOVERNMENT THEREBY INCURS NO RESPONSIBILITY, NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

**NOTICE: THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE
NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING
OF THE ESPIONAGE LAWS, TITLE 18, U.S.C., SECTIONS 793 and 794.
THE TRANSMISSION OR THE REVELATION OF ITS CONTENTS IN
ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.**

~~CONFIDENTIAL~~
U. S. Naval Proving Ground
Dahlgren, Virginia

Barrel Life Test with NACO (Navy Cool) Propellant
of
5"/54 Caliber Barrel Mk 18 Mod 0 Serial No. 16182
by

J. W. Duch
Weapons Development and Evaluation Laboratory

NPG REPORT NO. 1532

Task Assignment No.
NPG-85-5e-18-3-56

17 April 1957

APPROVED: G. H. WALES
Captain, USN
Commander, Naval Proving Ground


R. D. RISSE
Captain, USN
Ordnance Officer
By direction

RETAIN OR DESTROY IN ACCORDANCE WITH OPNAV INST 5510.1A.
NO REPORT OF DESTRUCTION IS REQUIRED. DO NOT RETURN.

~~CONFIDENTIAL~~
This Document Contains
Missing Page/s That Are
Unavailable In The
Original Document

56 1 114
Best Available Copy

CONTENTS

	<u>Page</u>
Abstract.	11
Foreword.	iii
Introduction.	1
Description of Material	1
Description of Test Equipment	2
Procedure	3
Results and Discussion.	4
Conclusions	7
References.	8
Appendices:	
A. Star Gauge Data (Tables 1-14)	
B. Tabulation of Velocity Variances (Table 15)	
C. Tables of Test Results (Tables 16-28)	
D. Distribution	

- - - - -

Figures:

1. Graph of Bore Enlargement at Origin of Bore vs Rounds Fired
2. Graph of Bore Enlargement vs Distance Forward of Origin of Bore at Various Stages of Wear
3. Graph of Bore Enlargement at Origin of Bore vs Erosion Gauge Reading
4. Graph of Muzzle Velocity Loss vs Bore Enlargement at Origin of Bore
5. Graph of Uncorrected Range vs Bore Enlargement at Origin of Bore
6. Graph of Uncorrected D/R vs Rounds Fired
7. Graph of Fuze Performance vs Rounds Fired
8. Graph of Temperatures in Cook-Off Round and External Barrel Temperatures, 28 April 1955
9. Graph of Temperatures in Cook-Off Round and External Barrel Temperatures, 15 June 1955

CONFIDENTIAL

MPC REPORT NO. 1532

ABSTRACT

A lot of 5"/54 NACO (Navy Cool) flashless propellant was evaluated with respect to erosion characteristics in rapid fire schedules. Erosion was reduced by a factor of three relative to the standard pyro powder.

CONFIDENTIAL

FOREWORD

The firings described in this report were conducted between 6 April 1955 and 21 December 1955. The tests were authorized by reference (a), under Task Assignment NPG-S5-5e-18-3-56, "Gun Barrel Life Tests" (reference (c)). This is the final report on "Rapid Fire Life Tests of 5"/54 Gun Barrel Mk 18 Mod 0 Serial Number 16182 using NACO Powder". Reference (b) replaced the barrel of reference (a) by barrel No. 16182 Mk 18 Mod 0.

This report was reviewed by the following members of the Weapons Development and Evaluation Laboratory:

R. I. ROSSBACHER, Head, Initial Ballistics Branch
D. C. SLOAN, Armament Division Engineer
D. W. STONER, Assistant Director for Technical
Applications
T. G. WHITE, JR., Captain, USN, Director

and by

R. H. LYDDANE, Director of Research

INTRODUCTION

Three lots of 5*54 NACO propellants, IHBf-24NA, IHBf-25NA and IHBf-26FNA, were granulated at the Naval Powder Factory. The Bureau of Ordnance requested that a rapid fire life test with the flashless type powder be conducted in the 5*54 Caliber Barrel Mk 18 Mod 0 Serial 16182. The standard 100-round rapid fire schedule was to be used until terminated by the Bureau or until a definite performance trend could be evaluated. Cold and hot gun erosion checks were to be fired using the flashless and the non-flashless type propellants.

DESCRIPTION OF MATERIAL

Propellants IHBf-24NA and IHBf-26FNA are of the cool single-base low nitration nitrocellulose type with nominal flame temperatures around 2150°K and the following characteristics:

	<u>IHBf-24NA</u>	<u>IHBf-26FNA</u>
Nitrocellulose	95.19%	92.92%
(%N)	12.01	12.02
Ethyl Centralite	3.78	2.98
Lead Carbonate (basic)	1.03	0.98
Total Volatiles	4.34	4.40
K ₂ SO ₄	-	3.12
Length	0.479	0.479
Diameter	0.267	0.266
Perforation Diameter	0.023	0.022
Perforations	7	7
Average Web	0.050	0.050
Grains per lb.	736	722
R.Q. (Based on IHBf-3)(%)	79.5	77.3
R.F. (Based on IHBf-3)(%)	89.7	86.0

DESCRIPTION OF TEST EQUIPMENTGun

The 5"/54 caliber barrel Mk 18 Mod 0 No. 16182 is a radially expanded barrel with conventional rifling of uniform 1/25 twist and OV005 chrome plate in the bore and chamber. Details of the design may be found on Bureau of Ordnance Drawing No. 660813. At the commencement of the life tests, the barrel had five actual rounds and a bore origin enlargement of OV004.

Mount

The 5"/54 caliber Mk 42 mount is an automatic loading mount capable of firing at a rate of 40 rounds per minute. For a detailed description of this mount, the reader is referred to O.D. 7295 and O.P. 1764.

Ammunition

- a. Projectiles: Mk 41 Mod 0, weighing 70 pounds; both inert and Comp. A loaded were used.
- (1) Fuzes: Mk 73 Mod 0 VT modified by disconnecting the self destroying element.
- (2) Nose Plugs: Drawing No. 434036.
- (3) Base Plugs: Drawing No. 881163.
- b. Charges: Full service.
- (1) (a) 19.71 lbs. Powder Index IHBf-24NA
- (b) 20.02 lbs. Powder Index IHBf-26FNA
- (2) Primer: Mk 45
- (3) Cartridge Case: Mk 7, brass
- (4) Plug: Mk 9, cork

- (5) Distance Piece: NGF Drawing 132664-18.
Two were used.
- (6) Wad: Pyralin. One was used.
- (7) Lead Foil: None.

Instrumentation

Standard coils and chronographs were used for the measurement of velocities.

Ranges were measured by means of theodolite bearings from shore stations.

Maximum chamber pressure was measured with 1/30 area copper crusher gauges on the erosion check rounds.

Thermocouples were located on the exterior surface of the barrel at one foot and 13 feet from the muzzle. Their output was recorded on a recording potentiometer.

A special round having thermocouples at two locations in the projectile and three locations in the fuze was used for recording data relative to cook-off.

PROCEDURE

The firing schedule as outlined in reference (a) was as follows:

- a. A 20-round cold gun erosion check, 10 with the flashless and 10 with the non-flashless type powders.
- b. Five 20-round bursts with a pause of 30 seconds between bursts, the first and last bursts with VT fuze rounds.
- c. A hot gun erosion check similar to the cold gun erosion check.
- d. Complete cooling of the gun.

This schedule was to be followed until terminated by the Bureau or until a definite performance trend could be evaluated.

The barrel was stargauged after every cycle and the bore was visually inspected at intervals during the tests.

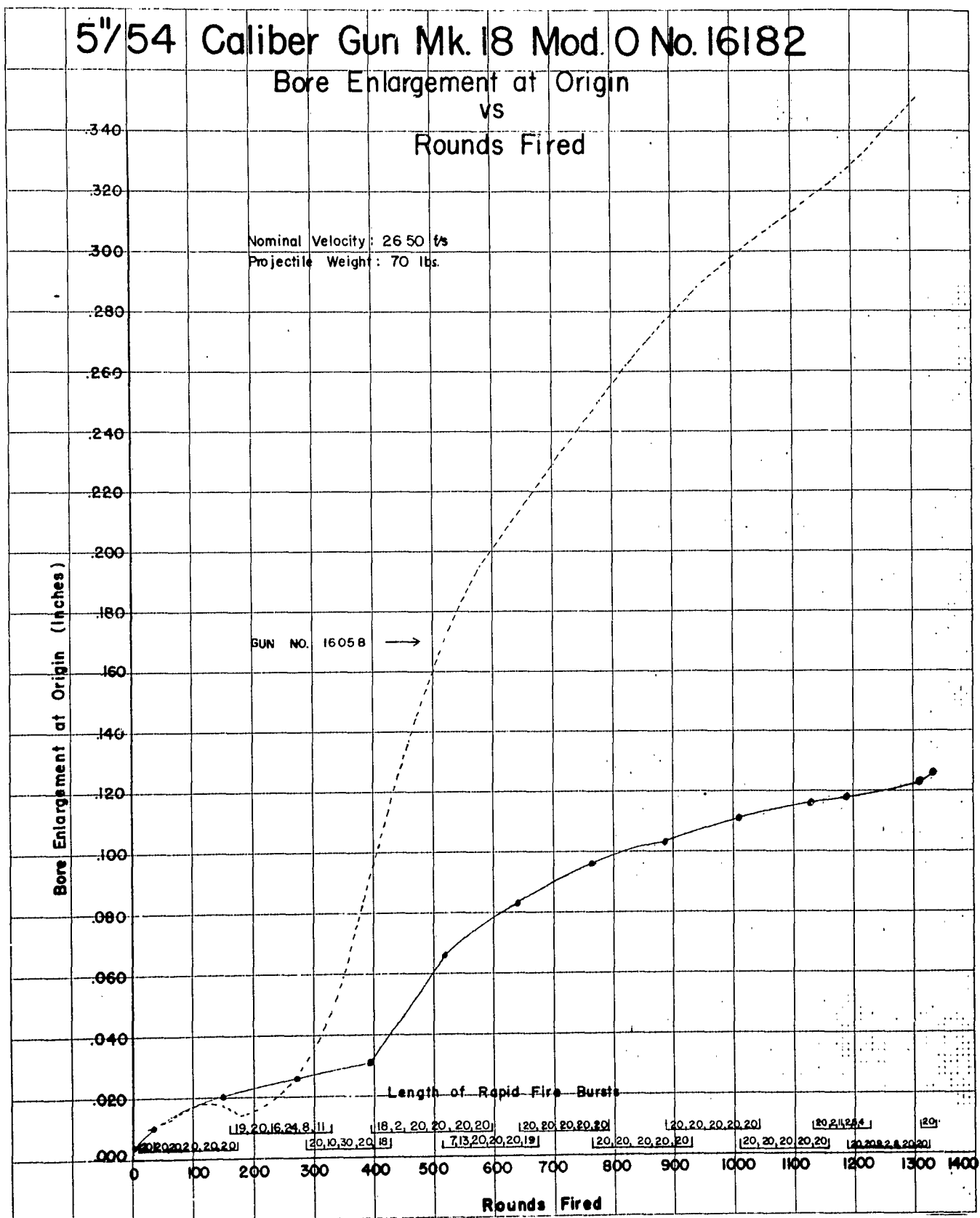
The 20-round cold and hot gun erosion check schedule was later changed to 10 rounds, five with the flashless and five with the non-flashless type powders.

RESULTS AND DISCUSSION

Most of the data contained in the figures referred to in the following discussion were reported in references (d) through (i). Reference (j) reported slow fire ballistic evaluation of IHBf-24NA, IHBf-26FNA and others.

Erosion Data

Figure 1 is a graph of bore origin enlargement as a function of rounds fired and shows the number of rounds for the rapid fire bursts between stargaugings. Figure 2 is a graphic presentation of bore profiles. Figure 3 is a graph of bore enlargement at the origin versus Mk 2 erosion gauge reading. As a basis for comparison, erosion curves for Mk 18 gun No. 16058, fired under an identical schedule but with standard pyro powder, were added to Figures 1, 2 and 3. The bore wear, in general, was greatly reduced in the NACO barrel when considering the number of rounds fired. However, the region forward of the bore origin, for a given bore origin enlargement, eroded to a greater extent in the NACO barrel than in the barrel fired with pyro powder. Figure 3 shows the advancement of the erosion gauge with respect to bore origin enlargement. Attention is invited to Figure 1 which shows an inflection point in the NACO curve at approximately 1250 rounds possibly indicating that the rate of bore origin enlargement increases sharply in this region. In firings similar to these, it is generally the rule to extrapolate the erosion curves to a predetermined value in order to obtain an erosion rate. It is felt that to do that in this case would probably introduce a large error. An erosion rate for the NACO barrel can be found, however, by obtaining the number of rounds fired in the pyro barrel corresponding to the final bore origin enlargement of the NACO barrel and taking the ratio of this value to the total number of rounds fired in the



CONFIDENTIAL

Figure 1

5"/54 Caliber Gun Mk. 18 Mod. O No. 16182

Barrel Erosion from 5" aft to 19" forward of the Origin of Bore
Enlargement of Bore and Band Seating Slope

VS

Distance Forward of Origin of Bore

Nominal Velocity: 2650 f/s
Projectile Weight: 79 lbs.
A. Gun No. 16058 after 705 E.S.R.

CURVE	ESR	LENGTH OF BURSTS
1	42	20
2	154	20, 20, 20, 20, 20
3	277	19, 20, 16, 24, 8, 11
4	399	20, 10, 30, 20, 18
5	522	16, 2, 20, 20, 20, 20
6	645	7, 3, 20, 20, 20, 19
7	768	20, 20, 20, 20, 20, 20
8	891	20, 20, 20, 20, 20, 20
9	1014	20, 20, 20, 20, 20, 20
10	1137	20, 20, 20, 20, 20, 20
11	1194	20, 2, 11, 2, 5, 4
12	1317	20, 20, 9, 2, 8, 20, 20
13	1336	20

CONFIDENTIAL

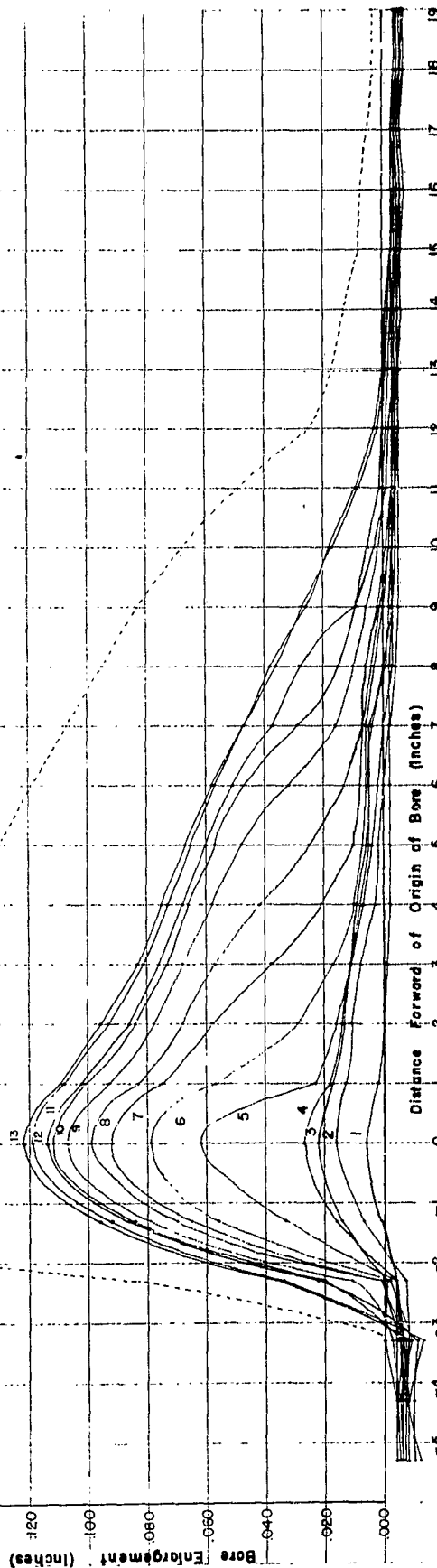
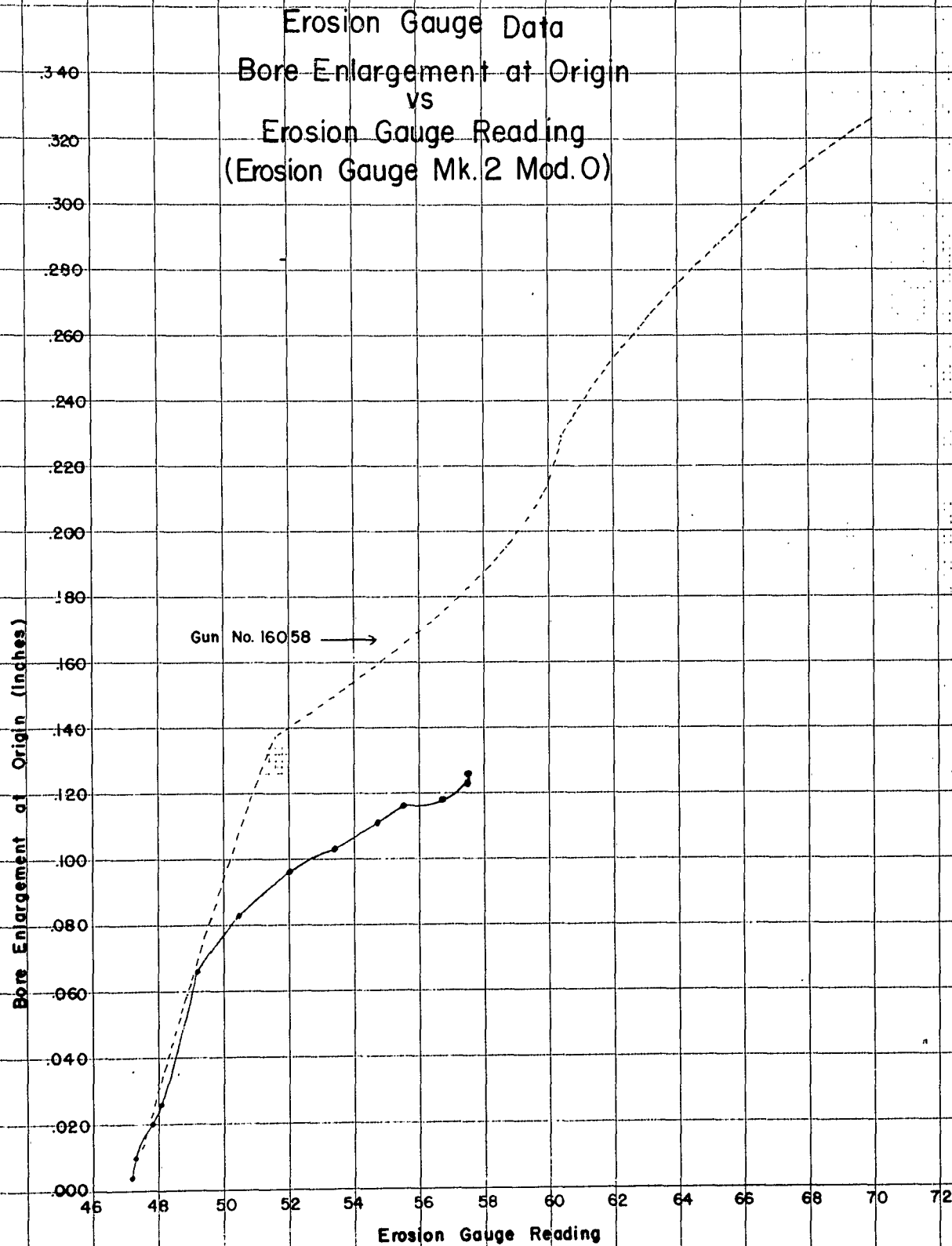


Figure 2

5"54 Caliber Gun Mk.18 Mod.0 No.16182



CONFIDENTIAL

Figure 3

NACO barrel. The ESR factor thus obtained is 0.33. This factor is probably high but is accepted on the premise that to obtain an ESR factor based on ballistic performance would not be practical because of the uncertainties involved.

Appendix (A), Tables 1 to 14 inclusive, comprises stargauge measurements of barrel No. 16182. These tables include land and groove measurements and Mk 2 erosion gauge readings.

Velocity Performance

Figure 4 is a graph of muzzle velocity loss versus bore enlargement at the origin. After the barrel became slightly worn, the muzzle velocity increased before it started to decrease. (This increase in velocity has been experienced in 3"/50 rapid fire trials and commonly in slow fire guns. In the bore origin enlargement region between OV066 and OV126, the velocity decrease was essentially linear and dropped at a rate of approximately 1.5 f/s for each OV001 bore origin enlargement. The rate for the pyro barrel was approximately 0.4 f/s in the region from OV000 to OV126. The velocity loss in the NACO barrel was approximately 13 f/s greater at the end of the test than the pyro barrel at the same bore origin enlargement. Because of this greater loss, the ESR factor based on physical bore measurements may become suspect. However, due to the uncertainties involved, no ESR factor is presented based on muzzle velocity loss.

The velocity variances for the cold and hot gun erosion checks and rapid fire were tested for homogeneity at an 0.05 level of confidence. All combinations were heterogeneous except the cold and hot gun erosion checks for IHBF-24NA and the hot erosion checks for IHBF-24NA and IHBF-26FNA. The pooled variance was 19 (f/s)² for the former and 18 (f/s)² for the latter. If the statistical tests could be disregarded, the pooled variance for the erosion checks would be 20 (f/s)² and for the rapid fire rounds 59 (f/s)². The comparable variances for the pyro barrel were 42 and 48 (f/s)², respectively. The unbiased velocity variances for the NACO barrel are listed in Appendix (B), Table 15.

CONFIDENTIAL

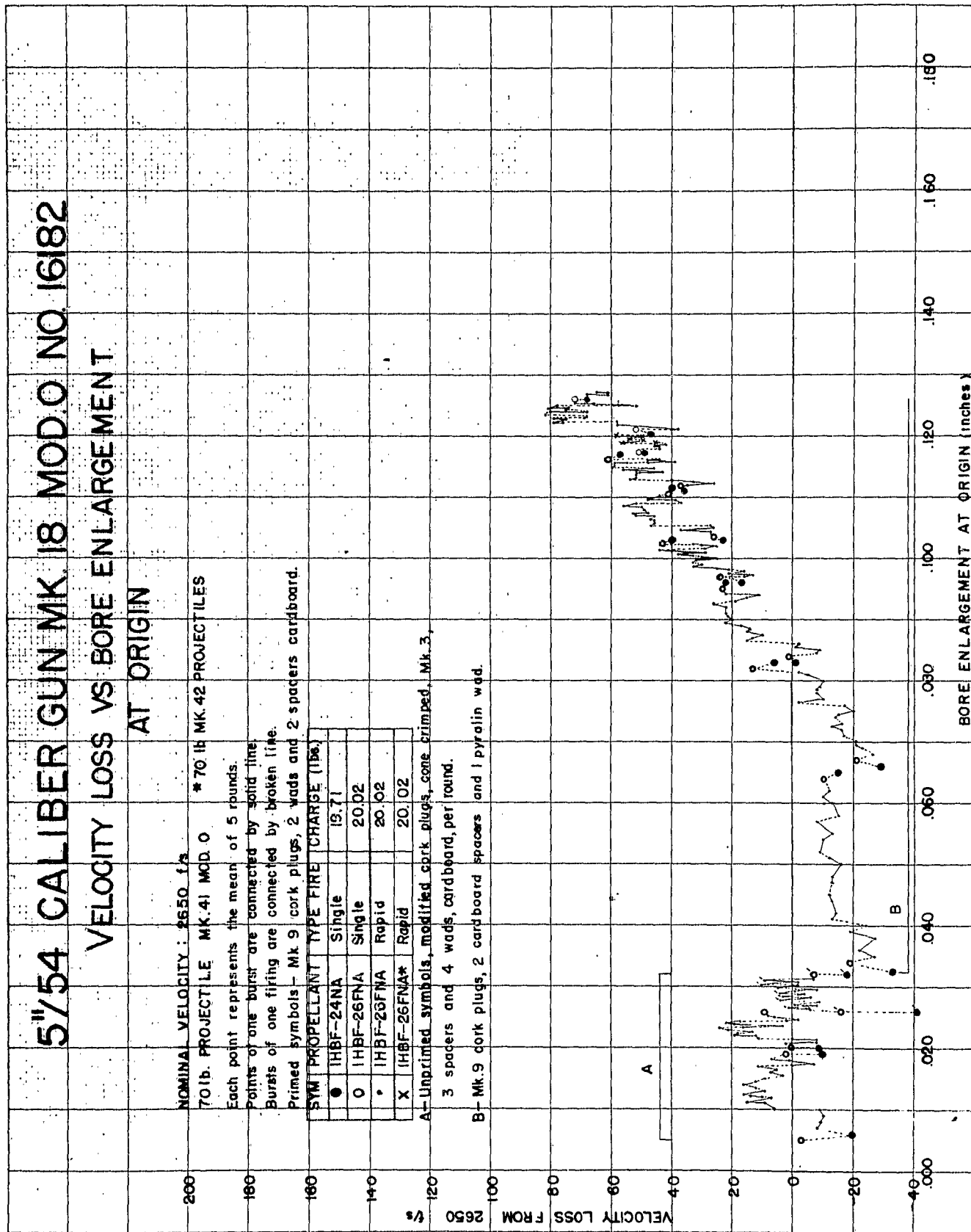


FIGURE 4

Range Performance

Appendix (C), Tables 16 to 28 inclusive, comprises ranging data. Figure 5 is a graphic presentation of uncorrected range versus bore enlargement at the origin. Figure 6 is a graph of the uncorrected D/R (%) versus rounds fired. The range dispersion is considered satisfactory and remained approximately the same throughout the test. The projectile for the tests reported herein was the Mk 41. Hence, no reference is made to the small number of rounds fired with the Mk 42 projectile. Because of the uncertainty in choosing the method of extrapolation, no ESR factor is presented based on range performance.

Fuze Performance

Figure 7 is a graph of VT fuze performance versus rounds fired. No decrease in normal fuze operability can be seen in the course of the rapid fire life tests. The average normal operability was 73%. It was 51% for the pyro barrel. Because of the uncertainty in choosing the method of extrapolation, no ESR factor is presented based on fuze performance.

Bore Constriction

Bore constriction occurred in barrel No. 16182 as was observed in other 5"/54 Mk 18 Mod 0 barrels. Constriction developed as a result of firing 32 rounds subsequent to proof of barrel. The firing included a 20-round rapid fire burst. The constriction did not reach the proportion experienced in the pyro barrel.

Coppering

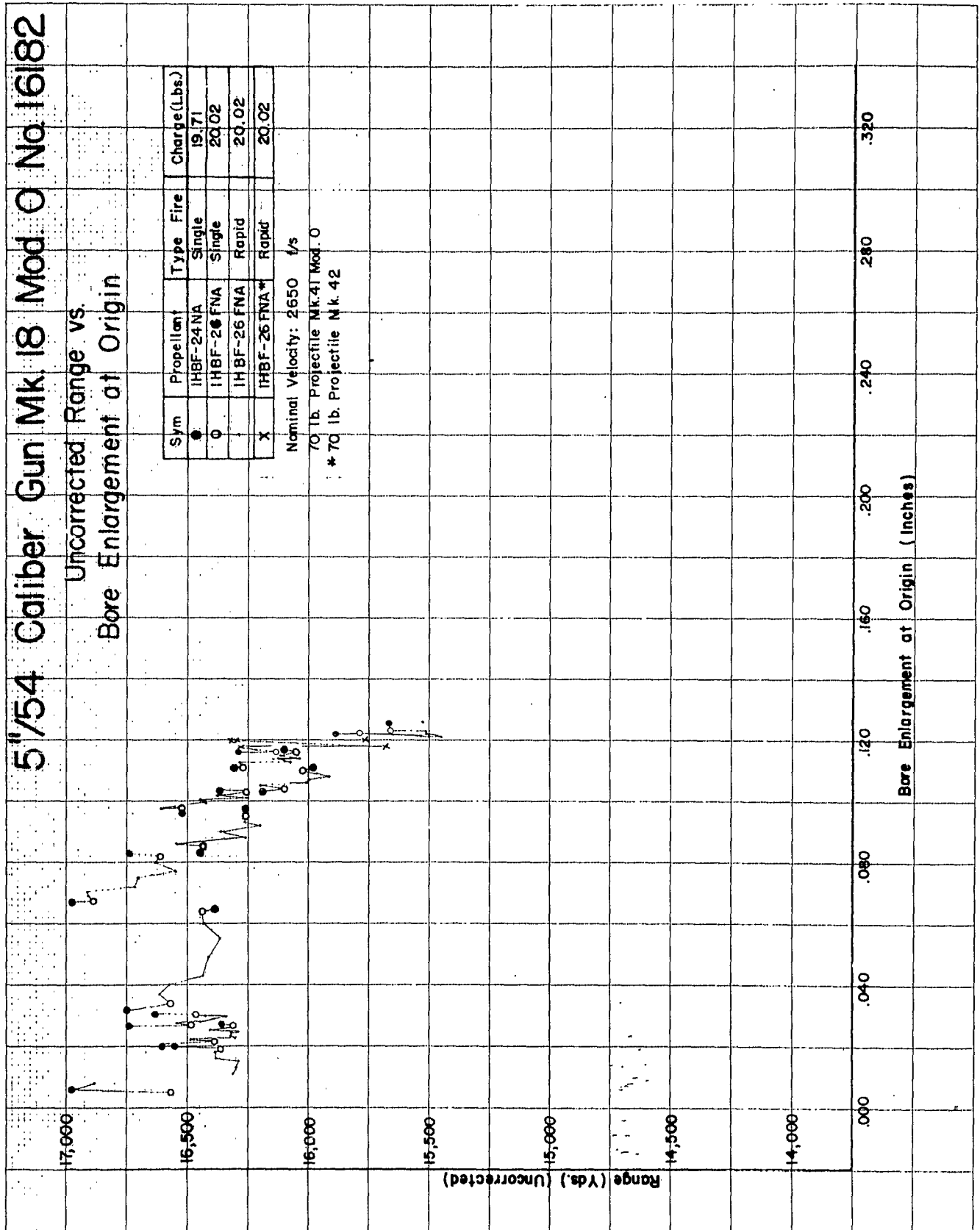
In the NACO barrel, it was noted that a light deposit of copper was present on lands and grooves from 2240 forward of the origin of rifling to the muzzle after 149 actual rounds, irregular deposits in the grooves from 940 to 1940 forward of the origin of rifling after 1009 actual rounds and deposits 1540 forward of origin of bore to approximately 11040 forward of the breech face. The pyro barrel was decoppered at the Naval Gun Factory after 181 actual rounds although

5"/54 Caliber Gun Mk. 18 Mod. 0 No. 16182

Uncorrected Range vs.
Bore Enlargement at Origin

Sym	Propellant	Type	Fire	Charge (Lbs.)
●	IHBF-24 NA	Single	Single	19.71
○	IHBF-26 FNA	Single	Single	20.02
×	IHBF-26 FNA	Rapid	Rapid	20.02
×	IHBF-26 FNA*	Rapid	Rapid	20.02

Nominal Velocity: 2650 f/s
70 lb. Projectile Mk. 41 Mod. 0
* 70 lb. Projectile Mk. 42



CONFIDENTIAL

Figure 5

CONFIDENTIAL

5"54 CALIBER GUN MK. 18 MOD. 0 NO. 16182

UNCORRECTED D/R VS ROUNDS FIRED

Nominal Velocity: 2650 f/s 70 lb. Projectile Mk. 41 Mod. 0			
* D/R estimated from long and short rounds at burst			
SYM	PROPELLANT	TYPE	FIRE CHARGE (Lbs.)
●	IHBF-24 NA	Single	19.71
○	IHBF-26 FNA	Single	20.02
•	IHBF-26 FNA	*Rapid	20.02
X	IHBF-26 FNA**	*Rapid	20.02

** 70 lb. MK. 42 PROJECTILES

D/R = 2.13
D/R = 1.77

UNCORRECTED D/R (%)

Based on 2 rounds

ROUNDS

1350

1200

1050

900

750

600

450

300

150

75

0

0.00

0.10

0.20

0.30

0.40

0.50

0.60

0.70

0.80

0.90

1.00

1.10

1.20

1.30

5"/54 Caliber Gun Mk.18 Mod.0 No.16182 Fuze Performance vs Rounds Fired

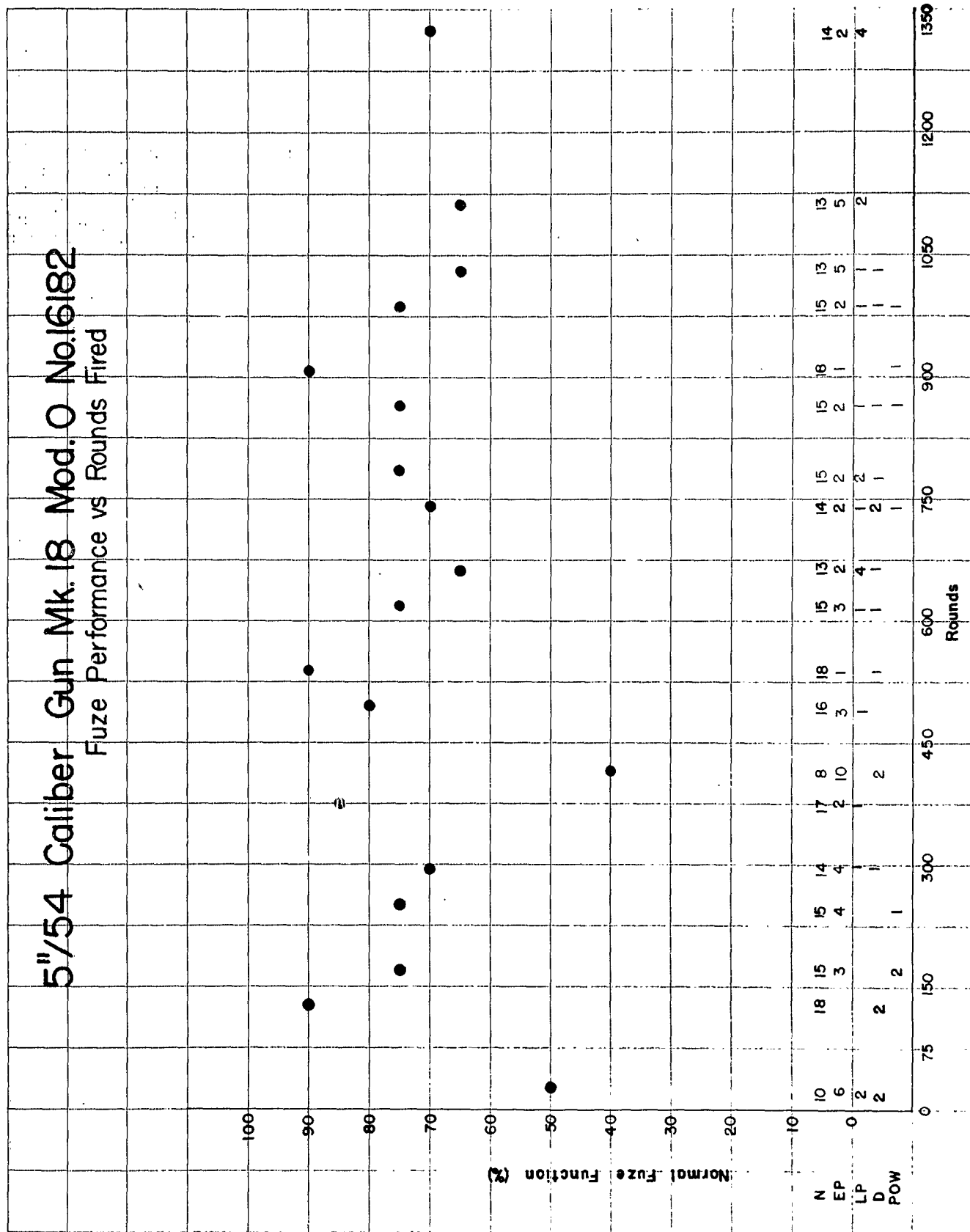


Figure 7

CONFIDENTIAL

no mention of copper deposits is made in Naval Proving Ground boresearch records until 1187 actual rounds had been fired. The greatest reduction in land-to-land diameter of the pyro barrel after 181 rounds was observed to be 0.0006. Deposits in the pyro barrel were observed in the region from 64.0 to 130.0 forward of breech face after 1187 actual rounds and from 68.0 to 130.0 forward of breech face after 1310 actual rounds. Basic lead carbonate was incorporated in the NACO powder composition. Separate lead foil was used in the assembly of rounds fired in the pyro barrel.

Barrel Temperature Data

Figures 8 and 9 are graphs of external barrel temperatures and temperatures in cook-off round versus time for cycles fired on 28 April 1955 and 15 June 1955. The maximum external barrel temperatures obtained for the NACO and pyro barrels together with the bore origin enlargement prior to the tests were as follows:

<u>Barrel</u>	<u>Date</u>	<u>Δ Do</u>	<u>1 ft. from Muzzle</u>	<u>13 ft. from Muzzle</u>
NACO	28 April 1955	0.0020	300°C	146°C
NACO	15 June 1955	0.0026	328°C	161°C
Pyro	27 March 1953	0.0014	357°C	162°C
Pyro	22 April 1953	0.0059	352°C	165°C

CONCLUSIONS

As a result of the test conducted, it is concluded that:

a. The use of IHBF-24NA and IHBF-26FNA in the 5"/54 Mk 18 Mod 0 barrel decreases the rate of erosion by a factor of three. An ESR factor of 0.33 was obtained.

b. There is no significant difference in copper fouling whether separate lead foil is used or basic lead carbonate is incorporated in the powder composition.

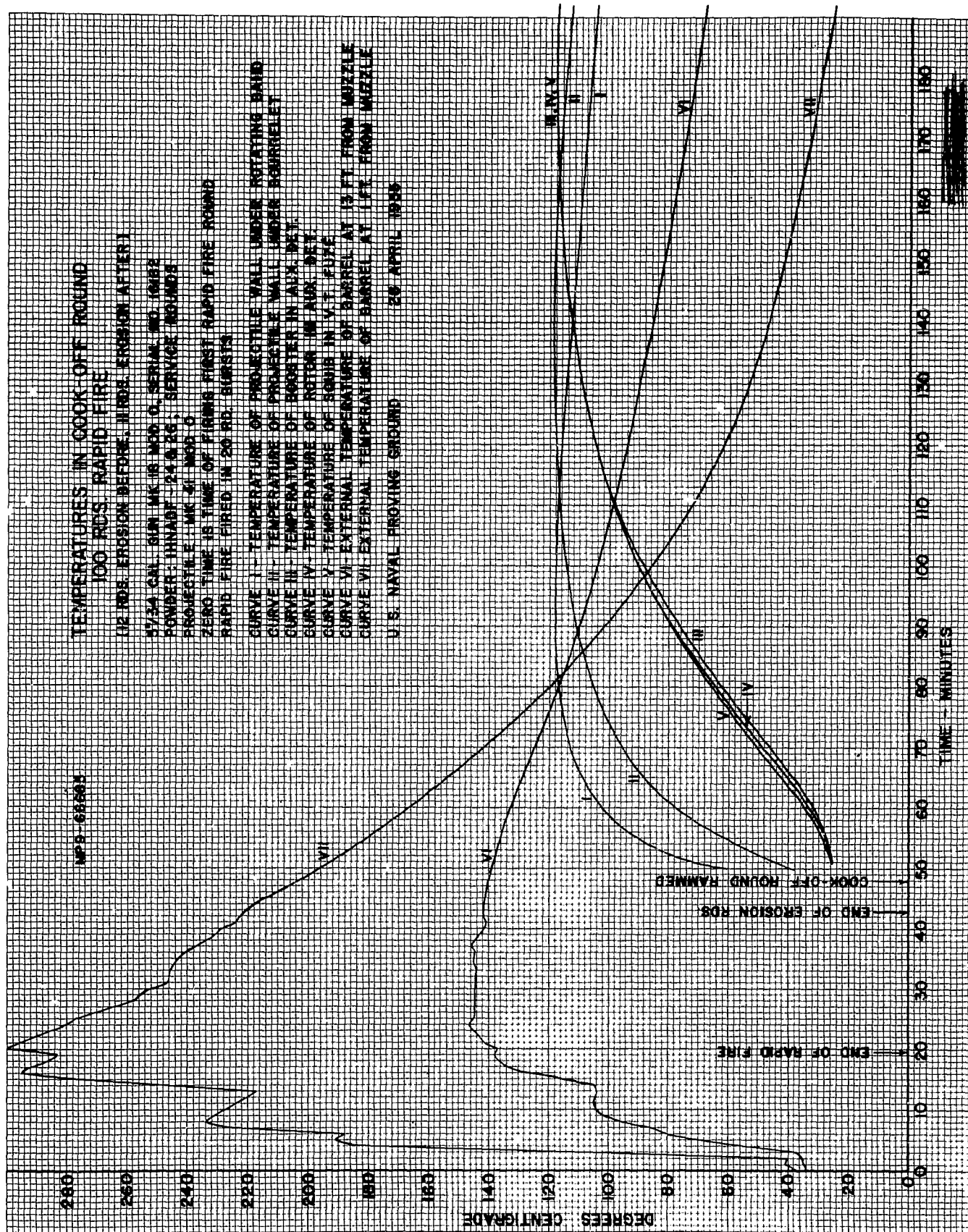


Figure 8

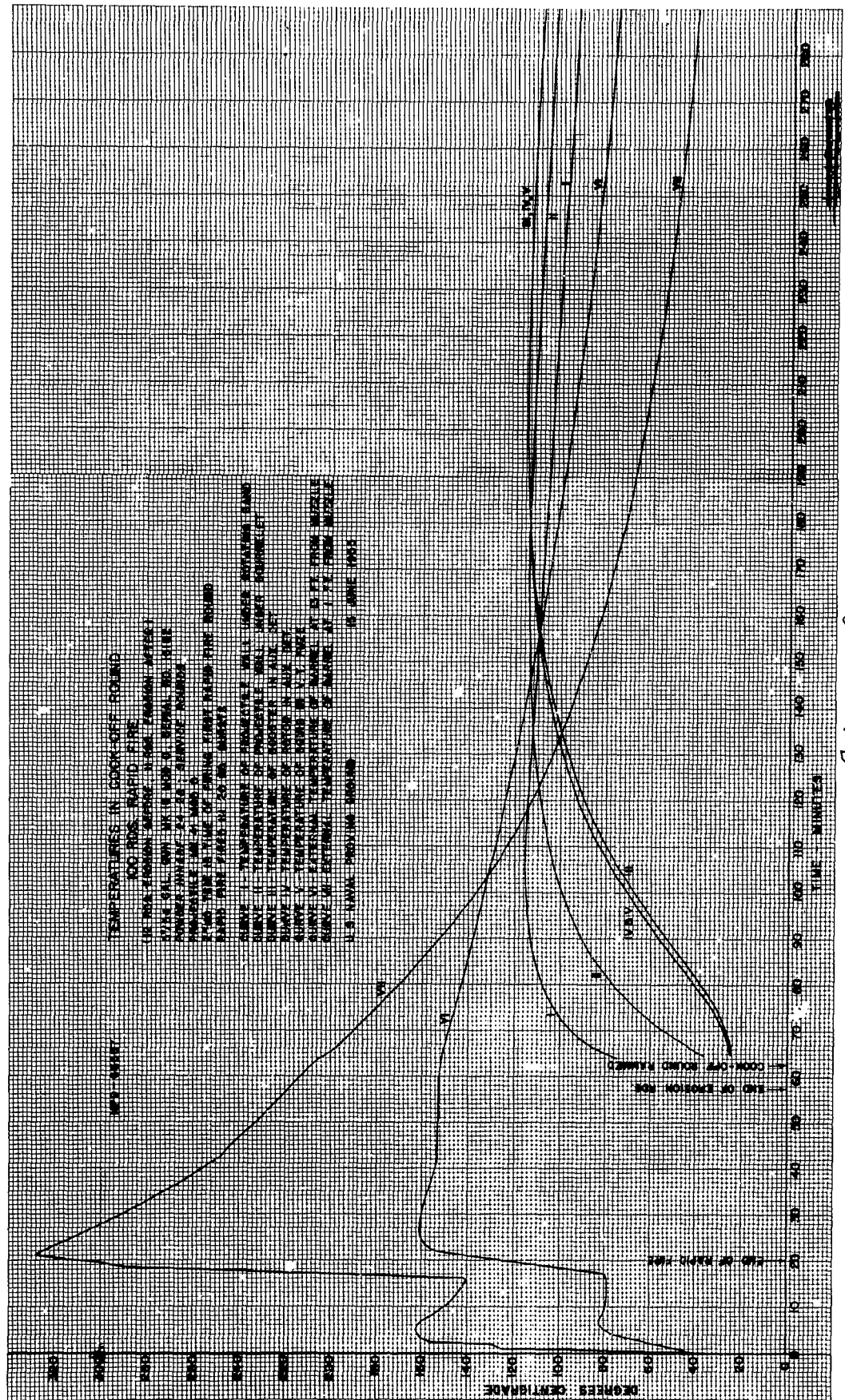


Figure 9

REFERENCES

- (a) BUORD ltr Re5e-JWW:llh S74-1(5") of 21 May 1954
- (b) BUORD ltr Re5e-FBW:lhj X15/1-1 of 18 Feb 1955
- (c) BUORD ltr Re5e-FBW:lhj All of 11 Jul 1955
- (d) NAVPROV Conf ltr OMI:JWD:amm X4/1-544 Ser 51645 of 27 May 1955
- (e) NAVPROV Conf ltr OMI:JWD:bdg X4/1-554 Ser 05192 of 27 Jun 1955
- (f) NAVPROV Conf ltr OMI:JWD:hbm X4/1-554 Ser 05240 of 9 Aug 1955
- (g) NAVPROV Conf ltr OMI:JWD:esc X4/1-554 Ser 05329 of 7 Sep 1955
- (h) NAVPROV Conf ltr OMI:JWD:ls X4/1-554 Ser 05445 of 7 Oct 1955
- (i) NAVPROV Conf ltr OMI:JWD:fcc X4/1-554 Ser 05796 of 16 Feb 1956
- (j) NPG Conf Report 1345 of 27 May 1955

APPENDIX A

TABLE 1

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182

Date: 1 April 1955 ESR: 10.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	54276	54276	200	54002	54002
231.32	.265	.264	199	.002	.002
230.32	.246	.246	198	.002	.002
229.32	.122	.123	197	.002	.002
228.32	.043	.043	196	.002	.002
227.01 (Bore Origin)	.004	.004	195	.002	.002
226.01	.003	.003	194	.002	.002
225.01	.003	.003	193	.002	.002
224.01	.003	.003	192	.002	.002
223.01	.003	.003	191	.002	.002
222.01	.003	.003	190	.002	.002
221.01	.003	.003	185	.002	.002
220.01	.003	.003	180	.002	.002
219.01	.003	.003	175	.002	.002
218.01	.003	.003	170	.002	.002
217.01	.003	.003	165	.002	.002
216.01	.003	.003	160	.002	.002
215.01	.003	.003	155	.001	.001
214	.003	.002	150	.001	.001
213	.003	.002	145	.001	.001
212	.003	.002	140	.001	.001
211	.003	.002	135	.001	.001
210	.002	.002	130	.001	.001
209	.003	.002	125	.001	.001
208	.003	.002	120	.001	.001
207	.003	.002	115	.001	.001
206	.002	.002	110	.001	.001
205	.002	.002	105	.001	.001
204	.002	.002	100	.001	.001
203	.002	.002	95	.001	.001
202	.002	.002	90	.001	.001
201	.002	.002	85	.001	.001

TABLE 1 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	57001	57001	22	57002	57003
75	.001	.001	21	.002	.003
70	.001	.001	20	.002	.003
65	.001	.001	19	.003	.003
60	.001	.001	18	.003	.003
55	.001	.001	17	.003	.003
50	.001	.001	16	.003	.004
45	.002	.001	15	.003	.004
40	.002	.002	14	.003	.004
36	.002	.002	13	.004	.004
35	.002	.002	12	.004	.004
34	.002	.002	11	.003	.004
33	.002	.002	10	.003	.003
32	.002	.002	9	.002	.003
31	.002	.003	8	.002	.003
30	.002	.003	7	.002	.003
29	.002	.003	6	.002	.003
28	.002	.003	5	.002	.003
27	.002	.003	4	.002	.003
26	.002	.003	3	.002	.003
25	.002	.003	2	.001	.002
24	.002	.003	1	.001	.002
23	.002	.003	M	.001	.002

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
47.20	47.20

TABLE 1 (Continued)

<u>GROOVES</u>					
<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>
232.32	57275	195	57100	35	57101
231.32	.264	194	.100	34	.101
230.32	.251	193	.101	33	.101
229.32	.127	192	.101	32	.101
228.32	.099	191	.101	31	.101
227.01	.100	190	.101	30	.101
226.01	.100	185	.101	29	.101
225.01	.100	180	.101	28	.101
224.01	.100	175	.101	27	.101
223.01	.100	170	.101	26	.101
222.01	.100	165	.101	25	.101
221.01	.100	160	.101	24	.101
220.01	.100	155	.101	23	.101
219.01	.100	150	.101	22	.101
218.01	.100	145	.101	21	.101
217.01	.100	140	.101	20	.101
216.01	.100	135	.101	19	.101
215.01	.100	130	.101	18	.101
214	.100	125	.101	17	.101
213	.100	120	.101	16	.101
212	.100	115	.101	15	.101
211	.100	110	.101	14	.101
210	.100	105	.101	13	.101
209	.100	100	.101	12	.101
208	.100	95	.101	11	.101
207	.100	90	.101	10	.101
206	.100	85	.101	9	.101
205	.100	80	.101	8	.101
204	.100	75	.101	7	.101
203	.100	70	.101	6	.101
202	.100	65	.101	5	.102
201	.100	60	.101	4	.102
200	.100	55	.101	3	.102
199	.100	50	.101	2	.102
198	.100	45	.101	1	.102
197	.100	40	.101	M	.102
196	.100	36	.101		

TABLE 2 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	57000	47999	22	57002	57001
75	.000	57000	21	.002	.001
70	.001	.000	20	.002	.001
65	.001	.000	19	.002	.001
60	.001	.000	18	.002	.002
55	.001	.000	17	.003	.002
50	.001	.000	16	.003	.002
45	.001	.000	15	.003	.002
40	.001	.000	14	.003	.002
36	.001	.000	13	.003	.002
35	.001	.001	12	.003	.002
34	.002	.001	11	.003	.002
33	.002	.001	10	.003	.002
32	.002	.001	9	.002	.002
31	.002	.001	8	.002	.002
30	.002	.001	7	.002	.002
29	.002	.001	6	.002	.002
28	.002	.001	5	.002	.002
27	.002	.001	4	.002	.001
26	.002	.001	3	.002	.002
25	.001	.001	2	.002	.001
24	.002	.001	1	.002	.001
23	.002	.001	M	.001	.001

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
47.30	47.30

CONFIDENTIAL

NPG REPORT NO. 1532

TABLE 3

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182

Date: 18 April 1955 ESR: 154.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	54270	54269	200	44996	44996
231.32	.260	.259	199	.996	.996
230.32	.237	.239	198	.996	.996
229.32	.116	.116	197	.996	.996
228.32	.050	.049	196	.996	.996
227.01	.020	.020	195	.996	.996
226.01	.015	.016	194	.996	.996
225.01	.013	.014	193	.996	.996
224.01	.010	.011	192	.996	.996
223.01	.005	.006	191	.996	.996
222.01	.004	.005	190	.996	.996
221.01	.002	.004	185	.995	.996
220.01	.000	.001	180	.996	.996
219.01	44999	44999	175	.996	.996
218.01	.998	.998	170	.996	.996
217.01	.998	.998	165	.997	.996
216.01	.998	.998	160	.996	.996
215.01	.998	.998	155	.997	.997
214	.997	.998	150	.997	.997
213	.997	.997	145	.997	.998
212	.997	.997	140	.998	.998
211	.997	.997	135	.998	.998
210	.997	.997	130	.998	.998
209	.997	.997	125	.998	.998
208	.997	.997	120	.999	.998
207	.997	.997	115	54000	.998
206	.997	.997	110	.000	.999
205	.996	.997	105	.000	.999
204	.996	.997	100	.000	54000
203	.996	.997	95	.002	.000
202	.996	.996	90	.002	.001
201	.996	.996	85	.002	.001

CONFIDENTIAL

TABLE 3 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	57002	57002	22	57003	57004
75	.002	.003	21	.003	.004
70	.002	.003	20	.003	.003
65	.003	.003	19	.004	.004
60	.003	.003	18	.005	.004
55	.003	.003	17	.004	.005
50	.003	.003	16	.004	.005
45	.003	.003	15	.005	.005
40	.003	.003	14	.005	.005
36	.004	.004	13	.005	.005
35	.003	.004	12	.005	.005
34	.004	.004	11	.005	.005
33	.004	.004	10	.005	.005
32	.003	.004	9	.003	.005
31	.003	.004	8	.005	.005
30	.003	.004	7	.004	.004
29	.003	.004	6	.005	.005
28	.003	.003	5	.005	.005
27	.003	.003	4	.005	.005
26	.004	.003	3	.003	.004
25	.004	.004	2	.002	.004
24	.003	.003	1	.002	.003
23	.003	.003	M	.002	.003

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
47.75	47.75

TABLE 3 (Continued)

<u>GROOVES</u>					
<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>
232.32	54260	195	54092	35	54100
231.32	.259	194	.092	34	.100
230.32	.245	193	.092	33	.100
229.32	.118	192	.092	32	.100
228.32	.091	191	.092	31	.100
227.01	.090	190	.092	30	.100
226.01	.091	185	.093	29	.100
225.01	.091	180	.093	28	.100
224.01	.091	175	.092	27	.100
223.01	.093	170	.093	26	.100
222.01	.093	165	.093	25	.100
221.01	.093	160	.094	24	.100
220.01	.093	155	.095	23	.100
219.01	.093	150	.095	22	.100
218.01	.093	145	.095	21	.100
217.01	.093	140	.095	20	.100
216.01	.093	135	.096	19	.100
215.01	.093	130	.098	18	.100
214	.094	125	.098	17	.100
213	.093	120	.099	16	.100
212	.093	115	.099	15	.100
211	.093	110	.098	14	.100
210	.093	105	.099	13	.100
209	.093	100	.099	12	.100
208	.093	95	.100	11	.100
207	.093	90	.100	10	.100
206	.093	85	.100	9	.100
205	.093	80	.100	8	.100
204	.093	75	.100	7	.100
203	.093	70	.100	6	.100
202	.093	65	.100	5	.100
201	.093	60	.100	4	.100
200	.093	55	.100	3	.100
199	.093	50	.100	2	.100
198	.093	45	.100	1	.100
197	.093	40	.100	M	.100
196	.093	36	.100		

TABLE 4 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	54003	54002	22	54005	54005
75	.003	.004	21	.005	.005
70	.004	.004	20	.005	.005
65	.004	.004	19	.005	.005
60	.005	.005	18	.005	.005
55	.004	.005	17	.006	.005
50	.004	.005	16	.006	.005
45	.004	.005	15	.006	.005
40	.005	.005	14	.006	.005
36	.005	.005	13	.006	.005
35	.005	.005	12	.006	.005
34	.005	.005	11	.006	.005
33	.005	.005	10	.006	.005
32	.005	.005	9	.006	.005
31	.005	.005	8	.006	.005
30	.005	.005	7	.006	.005
29	.005	.005	6	.006	.005
28	.005	.005	5	.006	.006
27	.005	.005	4	.006	.006
26	.005	.005	3	.007	.005
25	.005	.005	2	.005	.005
24	.005	.005	1	.005	.005
23	.005	.005	M	.004	.005

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
48.10	48.15

TABLE 4 (Continued)

<u>GROOVES</u>					
<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>
232.32	5V277	195	5V096	35	5V102
231.32	.261	194	.096	34	.102
230.32	.251	193	.096	33	.102
229.32	.119	192	.096	32	.102
228.32	.092	191	.096	31	.102
227.01	.092	190	.096	30	.102
226.01	.092	185	.096	29	.102
225.01	.092	180	.096	28	.102
224.01	.093	175	.096	27	.102
223.01	.093	170	.096	26	.102
222.01	.093	165	.097	25	.102
221.01	.093	160	.097	24	.102
220.01	.093	155	.098	23	.102
219.01	.093	150	.098	22	.102
218.01	.093	145	.098	21	.102
217.01	.094	140	.098	20	.102
216.01	.094	135	.099	19	.102
215.01	.095	130	.099	18	.102
214	.095	125	.100	17	.102
213	.095	120	.100	16	.102
212	.095	115	.100	15	.102
211	.095	110	.100	14	.102
210	.095	105	.100	13	.101
209	.095	100	.100	12	.102
208	.095	95	.101	11	.102
207	.095	90	.101	10	.102
206	.095	85	.101	9	.102
205	.096	80	.101	8	.103
204	.096	75	.101	7	.103
203	.096	70	.101	6	.103
202	.096	65	.101	5	.103
201	.096	60	.101	4	.102
200	.096	55	.101	3	.102
199	.096	50	.101	2	.102
198	.096	45	.102	1	.102
197	.096	40	.101	M	.103
196	.096	36	.101		

TABLE 5

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182

Date: 16 June 1955 ESR: 399.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	54271	54271	200	44996	44997
231.32	.260	.261	199	.996	.997
230.32	.241	.238	198	.996	.997
229.32	.118	.119	197	.996	.997
228.32	.058	.059	196	.996	.997
227.01	.032	.030	195	.996	.997
226.01	.020	.021	194	.996	.997
225.01	.017	.018	193	.996	.997
224.01	.014	.014	192	.996	.997
223.01	.011	.012	191	.996	.997
222.01	.008	.009	190	.996	.997
221.01	.008	.008	185	.996	.996
220.01	.006	.007	180	.996	.996
219.01	.002	.002	175	.995	.996
218.01	.001	.001	170	.995	.996
217.01	.000	44999	165	.995	.996
216.01	44999	.999	160	.996	.996
215.01	.998	.998	155	.996	.996
214	.998	.998	150	.996	.996
213	.998	.998	145	.997	.996
212	.998	.998	140	.997	.997
211	.997	.998	135	.998	.997
210	.997	.998	130	54000	.998
209	.997	.997	125	.000	.998
208	.997	.997	120	.000	.998
207	.997	.997	115	.000	.998
206	.997	.997	110	.000	54000
205	.997	.997	105	.000	.000
204	.997	.997	100	.002	.001
203	.997	.997	95	.002	.002
202	.997	.997	90	.003	.003
201	.996	.997	85	.003	.004

TABLE 5 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	54003	54004	22	54005	54005
75	.004	.004	21	.005	.005
70	.004	.005	20	.005	.005
65	.005	.005	19	.006	.005
60	.005	.005	18	.006	.006
55	.005	.005	17	.006	.006
50	.005	.005	16	.006	.006
45	.005	.005	15	.006	.005
40	.005	.005	14	.006	.006
36	.005	.005	13	.006	.006
35	.005	.005	12	.006	.006
34	.005	.005	11	.007	.005
33	.005	.005	10	.006	.006
32	.005	.005	9	.006	.005
31	.005	.005	8	.006	.005
30	.005	.005	7	.006	.005
29	.005	.005	6	.006	.005
28	.005	.005	5	.006	.005
27	.005	.005	4	.006	.006
26	.005	.006	3	.005	.006
25	.005	.006	2	.005	.005
24	.005	.005	1	.006	.005
23	.005	.005	M	.005	.005

Mk 2 Erosion Gauge Seating Distance (in inches):

No readings

TABLE 5 (Continued)GROOVES

<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>
232.32	54270	195	54093	35	54100
231.32	.258	194	.093	34	.100
230.32	.245	193	.093	33	.100
229.32	.121	192	.093	32	.100
228.32	.089	191	.093	31	.100
227.01	.088	190	.093	30	.100
226.01	.089	185	.093	29	.100
225.01	.090	180	.093	28	.100
224.01	.090	175	.093	27	.100
223.01	.090	170	.093	26	.100
222.01	.090	165	.093	25	.100
221.01	.090	160	.093	24	.100
220.01	.090	155	.094	23	.100
219.01	.090	150	.094	22	.100
218.01	.091	145	.095	21	.100
217.01	.091	140	.096	20	.100
216.01	.092	135	.096	19	.100
215.01	.092	130	.096	18	.101
214	.092	125	.096	17	.101
213	.092	120	.096	16	.101
212	.092	115	.097	15	.101
211	.093	110	.097	14	.101
210	.093	105	.098	13	.101
209	.093	100	.098	12	.101
208	.093	95	.098	11	.101
207	.093	90	.098	10	.101
206	.093	85	.098	9	.101
205	.093	80	.099	8	.101
204	.093	75	.099	7	.101
203	.093	70	.100	6	.101
202	.093	65	.100	5	.101
201	.093	60	.100	4	.101
200	.093	55	.100	3	.101
199	.093	50	.100	2	.101
198	.093	45	.100	1	.101
197	.093	40	.100	M	.101
196	.093	36	.100		

TABLE 6

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182

Date: 8 July 1955 ESR: 522.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	54270	54270	200	44995	44995
231.32	.259	.259	199	.995	.995
230.32	.242	.240	198	.995	.995
229.32	.118	.120	197	.995	.995
228.32	.071	.080	196	.995	.995
227.01	.065	.067	195	.995	.995
226.01	.025	.027	194	.995	.995
225.01	.018	.020	193	.995	.995
224.01	.014	.014	192	.995	.995
223.01	.011	.011	191	.995	.995
222.01	.007	.008	190	.995	.995
221.01	.008	.008	185	.995	.995
220.01	.007	.008	180	.995	.995
219.01	.003	.003	175	.995	.994
218.01	.000	.000	170	.995	.995
217.01	44999	.000	165	.995	.995
216.01	.999	44999	160	.995	.995
215.01	.998	.998	155	.995	.995
214	.998	.998	150	.996	.996
213	.997	.997	145	.996	.996
212	.996	.997	140	.996	.997
211	.996	.996	135	.996	.997
210	.996	.996	130	.997	.997
209	.996	.996	125	.998	.997
208	.996	.996	120	.999	.998
207	.996	.996	115	54000	.999
206	.996	.996	110	.000	.999
205	.996	.996	105	.000	.999
204	.996	.996	100	.001	54000
203	.996	.996	95	.001	.000
202	.996	.995	90	.001	.001
201	.995	.995	85	.002	.002

TABLE 6 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	58003	58002	22	58005	58005
75	.003	.002	21	.005	.005
70	.004	.003	20	.005	.005
65	.004	.004	19	.005	.005
60	.004	.004	18	.005	.005
55	.004	.004	17	.005	.005
50	.005	.004	16	.006	.005
45	.005	.004	15	.006	.005
40	.005	.005	14	.006	.005
36	.005	.005	13	.006	.005
35	.005	.005	12	.006	.005
34	.005	.005	11	.006	.005
33	.005	.005	10	.006	.005
32	.005	.005	9	.006	.005
31	.005	.005	8	.006	.005
30	.005	.005	7	.006	.005
29	.005	.005	6	.006	.005
28	.005	.005	5	.006	.005
27	.005	.005	4	.006	.005
26	.005	.005	3	.005	.005
25	.005	.005	2	.005	.005
24	.005	.005	1	.005	.004
23	.005	.005	M	.004	.004

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
49.15	49.25

TABLE 6 (Continued)GROOVES

<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>
232.32	54270	195	54093	35	54101
231.32	.258	194	.093	34	.101
230.32	.245	193	.093	33	.101
229.32	.121	192	.092	32	.101
228.32	.101	191	.092	31	.101
227.01	.093	190	.092	30	.101
226.01	.092	185	.092	29	.101
225.01	.090	180	.091	28	.101
224.01	.090	175	.091	27	.101
223.01	.091	170	.091	26	.101
222.01	.091	165	.091	25	.101
221.01	.092	160	.092	24	.101
220.01	.092	155	.094	23	.101
219.01	.092	150	.095	22	.101
218.01	.092	145	.096	21	.101
217.01	.092	140	.096	20	.101
216.01	.092	135	.097	19	.101
215.01	.092	130	.098	18	.101
214	.092	125	.098	17	.101
213	.092	120	.098	16	.101
212	.092	115	.098	15	.101
211	.093	110	.098	14	.101
210	.093	105	.098	13	.101
209	.093	100	.099	12	.101
208	.093	95	.099	11	.101
207	.093	90	.100	10	.101
206	.093	85	.100	9	.101
205	.093	80	.100	8	.101
204	.093	75	.100	7	.101
203	.093	70	.101	6	.101
202	.093	65	.100	5	.101
201	.093	60	.100	4	.101
200	.093	55	.100	3	.101
199	.093	50	.100	2	.101
198	.092	45	.101	1	.102
197	.092	40	.101	M	.102
196	.092	36	.101		

TABLE 7

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182

Date: 29 July 1955 ESR: 645.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	58270	58270	200	48996	48996
231.32	.260	.260	199	.996	.996
230.32	.238	.235	198	.996	.996
229.32	.121	.120	197	.996	.996
228.32	.098	.099	196	.996	.996
227.01	.082	.083	195	.996	.996
226.01	.061	.059	194	.996	.996
225.01	.032	.032	193	.996	.996
224.01	.021	.019	192	.996	.996
223.01	.013	.012	191	.996	.996
222.01	.010	.009	190	.996	.996
221.01	.009	.008	185	.996	.996
220.01	.009	.009	180	.995	.995
219.01	.006	.005	175	.995	.995
218.01	.003	.002	170	.995	.995
217.01	.001	.000	165	.995	.995
216.01	48999	.000	160	.994	.994
215.01	.998	48999	155	.994	.994
214	.998	.998	150	.994	.995
213	.998	.997	145	.994	.995
212	.997	.997	140	.995	.996
211	.997	.997	135	.995	.996
210	.997	.996	130	.996	.997
209	.997	.996	125	.997	.997
208	.997	.996	120	.997	.997
207	.997	.996	115	.997	.998
206	.997	.996	110	.997	.998
205	.997	.996	105	.998	.999
204	.997	.996	100	58000	58000
203	.997	.996	95	.000	.001
202	.997	.996	90	.001	.001
201	.997	.996	85	.002	.001

TABLE 7 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	54002	54003	22	54005	54006
75	.002	.003	21	.005	.006
70	.003	.003	20	.006	.005
65	.003	.004	19	.006	.006
60	.003	.003	18	.005	.006
55	.004	.003	17	.006	.006
50	.004	.004	16	.006	.006
45	.004	.004	15	.005	.006
40	.005	.005	14	.006	.006
36	.005	.005	13	.006	.006
35	.005	.005	12	.006	.005
34	.005	.005	11	.006	.005
33	.004	.005	10	.006	.006
32	.004	.005	9	.006	.005
31	.004	.005	8	.006	.005
30	.004	.005	7	.005	.006
29	.004	.005	6	.006	.005
28	.004	.005	5	.005	.005
27	.004	.005	4	.005	.006
26	.004	.005	3	.005	.005
25	.005	.005	2	.005	.005
24	.005	.005	1	.004	.004
23	.005	.005	M	.004	.004

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
50.40	50.60

TABLE 7 (Continued)

<u>GROOVES</u>					
<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>
232.32	57269	195	57093	35	57100
231.32	.258	194	.093	34	.101
230.32	.244	193	.093	33	.101
229.32	.121	192	.093	32	.101
228.32	.114	191	.093	31	.101
227.01	.111	190	.093	30	.101
226.01	.092	185	.092	29	.101
225.01	.089	180	.091	28	.101
224.01	.090	175	.091	27	.101
223.01	.090	170	.091	26	.101
222.01	.090	165	.090	25	.101
221.01	.091	160	.092	24	.101
220.01	.091	155	.094	23	.101
219.01	.092	150	.095	22	.101
218.01	.092	145	.095	21	.101
217.01	.092	140	.096	20	.101
216.01	.092	135	.096	19	.101
215.01	.092	130	.097	18	.101
214	.092	125	.097	17	.101
213	.092	120	.097	16	.101
212	.093	115	.097	15	.102
211	.093	110	.097	14	.101
210	.093	105	.098	13	.102
209	.093	100	.098	12	.102
208	.093	95	.098	11	.102
207	.093	90	.099	10	.102
206	.093	85	.098	9	.102
205	.093	80	.099	8	.102
204	.093	75	.100	7	.102
203	.093	70	.100	6	.102
202	.093	65	.100	5	.102
201	.093	60	.100	4	.103
200	.093	55	.100	3	.103
199	.093	50	.100	2	.103
198	.093	45	.100	1	.103
197	.093	40	.100	M	.104
196	.093	36	.100		

TABLE 8

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182

Date: 16 August 1955 ESR: 768.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	58269	58269	200	48996	48995
231.32	.257	.258	198	.996	.995
230.32	.242	.240	198	.996	.995
229.32	.125	.122	197	.996	.995
228.32	.107	.108	196	.996	.995
227.01	.096	.096	195	.996	.995
226.01	.078	.077	194	.996	.995
225.01	.060	.062	193	.996	.995
224.01	.037	.045	192	.996	.995
223.01	.025	.023	191	.995	.995
222.01	.013	.013	190	.996	.995
221.01	.011	.010	189	.996	.995
220.01	.010	.009	180	.995	.995
219.01	.008	.006	175	.995	.995
218.01	.004	.003	170	.995	.994
217.01	.002	.000	165	.994	.994
216.01	.000	.000	160	.994	.993
215.01	.000	.000	155	.994	.994
214	48999	48999	150	.994	.994
213	.999	.999	145	.994	.994
212	.998	.998	140	.995	.995
211	.996	.997	135	.996	.996
210	.997	.997	130	.996	.995
209	.997	.997	125	.997	.997
208	.996	.996	120	.997	.999
207	.996	.996	115	.998	.999
206	.996	.996	110	.998	.999
205	.996	.996	105	58000	58000
204	.996	.996	100	.000	.000
203	.996	.995	95	.001	.000
202	.996	.995	90	.002	.001
201	.996	.995	85	.002	.001

TABLE 8 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	58003	58002	22	58005	58005
75	.003	.002	21	.004	.005
70	.004	.003	20	.005	.005
65	.004	.004	19	.005	.005
60	.005	.004	18	.005	.005
55	.004	.004	17	.005	.005
50	.005	.004	16	.006	.005
45	.005	.005	15	.006	.005
40	.005	.005	14	.006	.005
36	.005	.005	13	.006	.005
35	.004	.005	12	.006	.005
34	.004	.005	11	.006	.005
33	.004	.005	10	.006	.005
32	.004	.005	9	.006	.006
31	.004	.005	8	.006	.006
30	.004	.005	7	.006	.006
29	.005	.005	6	.005	.006
28	.005	.005	5	.005	.006
27	.005	.005	4	.005	.005
26	.005	.005	3	.005	.005
25	.005	.005	2	.005	.005
24	.005	.005	1	.004	.005
23	.005	.005	M	.004	.004

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
52.00	52.00

TABLE 8 (Continued)GROOVES

<u>Distance from Muzzle (inches)</u>	<u>Reading (inches) Point Up</u>	<u>Distance from Muzzle (inches)</u>	<u>Reading (inches) Point Up</u>	<u>Distance from Muzzle (inches)</u>	<u>Reading (inches) Point Up</u>
232.32	54269	195	54093	35	54101
231.32	.258	194	.092	34	.101
230.32	.244	193	.093	33	.101
229.32	.123	192	.093	32	.101
228.32	.126	191	.093	31	.101
227.01	.119	190	.092	30	.101
226.01	.106	185	.092	29	.101
225.01	.088	180	.092	28	.101
224.01	.090	175	.091	27	.101
223.01	.090	170	.091	26	.101
222.01	.090	165	.092	25	.101
221.01	.091	160	.093	24	.101
220.01	.091	155	.095	23	.101
219.01	.091	150	.096	22	.101
218.01	.091	145	.097	21	.101
217.01	.091	140	.098	20	.101
216.01	.092	135	.098	19	.101
215.01	.092	130	.098	18	.101
214	.092	125	.098	17	.101
213	.092	120	.097	16	.101
212	.092	115	.098	15	.101
211	.092	110	.098	14	.101
210	.092	105	.098	13	.101
209	.092	100	.098	12	.101
208	.092	95	.098	11	.101
207	.092	90	.099	10	.101
206	.093	85	.100	9	.101
205	.093	80	.100	8	.101
204	.092	75	.100	7	.101
203	.092	70	.100	6	.101
202	.093	65	.100	5	.101
201	.093	60	.101	4	.101
200	.093	55	.101	3	.101
199	.092	50	.101	2	.101
198	.092	45	.101	1	.102
197	.093	40	.101	M	.100
196	.093	36	.101		

TABLE 9

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182

Date: 23 August 1955 ESR: 891.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	50270	50270	200	40996	40996
231.32	.259	.259	199	.996	.996
230.32	.238	.240	198	.996	.996
229.32	.125	.122	197	.996	.996
228.32	.112	.114	196	.996	.996
227.01	.103	.103	195	.996	.996
226.01	.085	.086	194	.996	.996
225.01	.070	.071	193	.996	.996
224.01	.060	.060	192	.996	.996
223.01	.046	.044	191	.996	.996
222.01	.025	.030	190	.996	.996
221.01	.015	.016	185	.995	.995
220.01	.010	.010	180	.995	.995
219.01	.009	.008	175	.995	.995
218.01	.004	.005	170	.995	.996
217.01	.002	.001	165	.995	.995
216.01	.000	.000	160	.995	.994
215.01	40998	.000	155	.995	.995
214	.998	40999	150	.995	.995
213	.998	.999	145	.995	.995
212	.998	.998	140	.996	.996
211	.997	.997	135	.996	.996
210	.996	.997	130	.996	.997
209	.996	.997	125	.997	.998
208	.996	.996	120	.997	.998
207	.996	.996	115	.997	.999
206	.996	.996	110	.999	50000
205	.996	.996	105	50000	.000
204	.996	.996	100	.000	.000
203	.996	.996	95	.001	.001
202	.996	.996	90	.002	.002
201	.996	.996	85	.003	.002

TABLE 9 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	54004	54003	22	54005	54005
75	.003	.003	21	.005	.005
70	.003	.003	20	.006	.005
65	.004	.005	19	.006	.005
60	.005	.005	18	.006	.005
55	.004	.005	17	.006	.005
50	.005	.005	16	.006	.006
45	.005	.005	15	.006	.006
40	.005	.005	14	.006	.005
36	.004	.005	13	.006	.006
35	.004	.005	12	.006	.006
34	.004	.005	11	.007	.006
33	.004	.005	10	.005	.006
32	.004	.005	9	.006	.006
31	.005	.005	8	.006	.006
30	.005	.005	7	.006	.006
29	.005	.005	6	.006	.006
28	.005	.005	5	.006	.006
27	.005	.005	4	.006	.006
26	.005	.005	3	.005	.006
25	.005	.005	2	.005	.006
24	.005	.005	1	.005	.005
23	.005	.004	M	.005	.004

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
53.25	53.45

TABLE 9 (Continued)

<u>GROOVES</u>					
<u>Distance from Muzzle (inches)</u>	<u>Reading (inches) Point Up</u>	<u>Distance from Muzzle (inches)</u>	<u>Reading (inches) Point Up</u>	<u>Distance from Muzzle (inches)</u>	<u>Reading (inches) Point Up</u>
232.32	57270	195	57093	35	57101
231.32	.259	194	.093	34	.101
230.32	.248	193	.093	33	.101
229.32	.137	192	.093	32	.101
228.32	.133	191	.093	31	.101
227.01	.129	190	.094	30	.101
226.01	.116	185	.092	29	.101
225.01	.103	180	.091	28	.101
224.01	.090	175	.092	27	.101
223.01	.090	170	.091	26	.101
222.01	.092	165	.090	25	.101
221.01	.092	160	.092	24	.101
220.01	.092	155	.095	23	.101
219.01	.092	150	.095	22	.101
218.01	.093	145	.096	21	.101
217.01	.093	140	.097	20	.101
216.01	.094	135	.098	19	.102
215.01	.093	130	.098	18	.102
214	.093	125	.098	17	.102
213	.093	120	.098	16	.102
212	.094	115	.098	15	.102
211	.094	110	.098	14	.102
210	.093	105	.099	13	.102
209	.094	100	.100	12	.102
208	.094	95	.099	11	.102
207	.094	90	.100	10	.102
206	.094	85	.100	9	.102
205	.094	80	.100	8	.102
204	.094	75	.101	7	.102
203	.094	70	.101	6	.102
202	.094	65	.101	5	.102
201	.094	60	.101	4	.102
200	.094	55	.100	3	.102
199	.094	50	.100	2	.102
198	.094	45	.101	1	.102
197	.094	40	.101	M	.103
196	.093	36	.101		

TABLE 10

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182

Date: 27 August 1955 ESR: 1014.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	54270	54270	200	44997	44996
231.32	.260	.260	199	.997	.996
230.32	.243	.243	198	.997	.996
229.32	.137	.130	197	.997	.996
228.32	.121	.123	196	.996	.996
227.01	.111	.111	195	.996	.996
226.01	.096	.095	194	.996	.996
225.01	.080	.081	193	.996	.996
224.01	.070	.071	192	.996	.996
223.01	.060	.062	191	.996	.996
222.01	.049	.053	190	.996	.996
221.01	.034	.035	185	.996	.995
220.01	.017	.020	180	.996	.995
219.01	.013	.013	175	.996	.995
218.01	.010	.008	170	.996	.995
217.01	.005	.004	165	.996	.995
216.01	.003	.002	160	.995	.995
215.01	.001	.002	155	.996	.996
214	.000	.001	150	.996	.995
213	.000	.000	145	.996	.995
212	.000	.000	140	.998	.996
211	.000	.000	135	.998	.997
210	44999	44999	130	.998	.997
209	.999	.998	125	.998	.998
208	.998	.998	120	.998	.999
207	.998	.998	115	54000	.999
206	.998	.998	110	.000	.999
205	.998	.997	105	.000	54000
204	.998	.997	100	.001	.001
203	.998	.997	95	.001	.002
202	.998	.997	90	.002	.002
201	.998	.996	85	.003	.002

TABLE 10 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	54003	54003	22	54005	54006
75	.003	.003	21	.005	.006
70	.004	.004	20	.005	.006
65	.004	.005	19	.005	.006
60	.005	.005	18	.005	.006
55	.005	.005	17	.005	.006
50	.005	.005	16	.005	.006
45	.005	.005	15	.006	.006
40	.005	.006	14	.006	.007
36	.005	.006	13	.006	.006
35	.005	.006	12	.006	.006
34	.005	.006	11	.006	.006
33	.005	.006	10	.006	.006
32	.005	.006	9	.006	.006
31	.005	.005	8	.006	.006
30	.005	.005	7	.006	.006
29	.005	.005	6	.006	.006
28	.005	.005	5	.005	.006
27	.005	.005	4	.006	.006
26	.005	.005	3	.005	.006
25	.005	.005	2	.005	.005
24	.005	.006	1	.004	.004
23	.005	.006	M	.004	.004

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
54.75	54.60

TABLE 10 (Continued)GROOVES

<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>
232.32	54272	195	54095	35	54101
231.32	.261	194	.095	34	.101
230.32	.249	193	.095	33	.101
229.32	.145	192	.095	32	.101
228.32	.136	191	.096	31	.101
227.01	.134	190	.096	30	.101
226.01	.124	185	.095	29	.101
225.01	.105	180	.094	28	.101
224.01	.096	175	.093	27	.101
223.01	.092	170	.093	26	.101
222.01	.092	165	.094	25	.101
221.01	.093	160	.095	24	.101
220.01	.094	155	.097	23	.101
219.01	.094	150	.096	22	.101
218.01	.094	145	.096	21	.101
217.01	.094	140	.097	20	.101
216.01	.094	135	.097	19	.101
215.01	.094	130	.098	18	.101
214	.095	125	.098	17	.101
213	.095	120	.098	16	.101
212	.095	115	.098	15	.101
211	.095	110	.098	14	.101
210	.095	105	.098	13	.101
209	.095	100	.098	12	.101
208	.095	95	.098	11	.102
207	.095	90	.098	10	.101
206	.095	85	.098	9	.101
205	.095	80	.100	8	.102
204	.095	75	.100	7	.102
203	.095	70	.100	6	.102
202	.095	65	.100	5	.102
201	.095	60	.100	4	.102
200	.095	55	.100	3	.102
199	.095	50	.100	2	.102
198	.095	45	.101	1	.102
197	.096	40	.101	M	.103
196	.095	36	.101		

TABLE 11

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182

Date: 2 September 1955 ESR: 1137.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	54268	54268	200	44994	44995
231.32	.256	.257	199	.994	.995
230.32	.240	.240	198	.994	.995
229.32	.144	.141	197	.994	.995
228.32	.125	.129	196	.994	.995
227.01	.116	.115	195	.994	.995
226.01	.103	.104	194	.994	.995
225.01	.086	.088	193	.994	.995
224.01	.075	.077	192	.994	.994
223.01	.067	.070	191	.994	.994
222.01	.059	.060	190	.994	.995
221.01	.049	.050	185	.994	.994
220.01	.034	.029	180	.994	.995
219.01	.017	.019	175	.994	.994
218.01	.010	.013	170	.994	.994
217.01	.005	.006	165	.994	.994
216.01	.002	.002	160	.994	.994
215.01	.000	.001	155	.994	.995
214	44998	.000	150	.994	.995
213	.998	44999	145	.995	.996
212	.997	.998	140	.995	.996
211	.996	.998	135	.996	.996
210	.996	.997	130	.996	.996
209	.996	.996	125	.996	.996
208	.995	.996	120	.997	.998
207	.995	.996	115	.998	.999
206	.995	.996	110	.998	.999
205	.994	.995	105	54000	54000
204	.994	.995	100	.000	.000
203	.994	.995	95	.000	.001
202	.994	.995	90	.000	.002
201	.994	.995	85	.001	.002

TABLE 11 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	54002	54003	22	54005	54006
75	.002	.003	21	.005	.006
70	.001	.004	20	.005	.006
65	.003	.004	19	.005	.006
60	.003	.004	18	.005	.006
55	.003	.004	17	.005	.006
50	.004	.004	16	.005	.006
45	.003	.005	15	.005	.006
40	.003	.005	14	.005	.006
36	.003	.005	13	.005	.006
35	.003	.005	12	.005	.006
34	.003	.005	11	.005	.006
33	.004	.005	10	.005	.006
32	.004	.005	9	.005	.006
31	.004	.005	8	.005	.006
30	.004	.005	7	.005	.005
29	.004	.005	6	.005	.006
28	.004	.005	5	.005	.006
27	.004	.005	4	.005	.005
26	.004	.005	3	.005	.005
25	.005	.005	2	.005	.004
24	.005	.006	1	.004	.004
23	.005	.006	M	.004	.004

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
55.45	55.50

TABLE 11 (Continued)GROOVES

<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>
232.32	54270	195	54094	35	54102
231.32	.260	194	.094	34	.102
230.32	.248	193	.094	33	.102
229.32	.152	192	.094	32	.102
228.32	.147	191	.095	31	.102
227.01	.140	190	.095	30	.102
226.01	.130	185	.094	29	.102
225.01	.114	180	.093	28	.102
224.01	.105	175	.092	27	.102
223.01	.091	170	.093	26	.102
222.01	.091	165	.094	25	.102
221.01	.091	160	.094	24	.102
220.01	.091	155	.096	23	.102
219.01	.092	150	.097	22	.102
218.01	.092	145	.098	21	.102
217.01	.092	140	.098	20	.102
216.01	.093	135	.098	19	.102
215.01	.094	130	.098	18	.102
214	.094	125	.098	17	.102
213	.094	120	.098	16	.102
212	.094	115	.099	15	.102
211	.094	110	.099	14	.102
210	.094	105	.100	13	.102
209	.094	100	.100	12	.102
208	.095	95	.100	11	.102
207	.095	90	.100	10	.102
206	.094	85	.100	9	.102
205	.094	80	.100	8	.102
204	.094	75	.101	7	.102
203	.094	70	.101	6	.102
202	.094	65	.101	5	.102
201	.094	60	.101	4	.102
200	.094	55	.102	3	.102
199	.094	50	.102	2	.102
198	.094	45	.102	1	.102
197	.094	40	.102	M	.102
196	.094	36	.102		

CONFIDENTIAL

NPG REPORT NO. 1532

TABLE 12

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182

Date: 4 October 1955 ESR: 1194.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	54265	54266	200	44995	44995
231.32	.255	.255	199	.995	.995
230.32	.234	.235	198	.995	.995
229.32	.146	.143	197	.995	.995
228.32	.130	.128	196	.994	.994
227.01	.118	.118	195	.994	.994
226.01	.105	.105	194	.994	.994
225.01	.089	.089	193	.994	.993
224.01	.078	.080	192	.994	.993
223.01	.072	.070	191	.994	.993
222.01	.063	.063	190	.994	.994
221.01	.054	.054	185	.993	.993
220.01	.042	.038	180	.993	.993
219.01	.033	.028	175	.993	.993
218.01	.004	.019	170	.993	.992
217.01	.005	.011	165	.993	.992
216.01	.003	.005	160	.993	.993
215.01	.002	.003	155	.995	.995
214	.001	.002	150	.995	.996
213	.001	.001	145	.996	.996
212	.000	.000	140	.997	.996
211	.000	44999	135	.997	.999
210	44999	.998	130	.998	.998
209	.998	.998	125	.998	.997
208	.998	.997	120	.998	.997
207	.997	.997	115	.998	.999
206	.996	.996	110	.999	54000
205	.996	.996	105	.999	.000
204	.995	.995	100	54000	.000
203	.995	.995	95	.001	.001
202	.995	.995	90	.002	.002
201	.995	.995	85	.003	.002

CONFIDENTIAL

TABLE 12 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	54003	54003	22	54005	54005
75	.004	.003	21	.005	.005
70	.004	.004	20	.006	.005
65	.004	.005	19	.006	.005
60	.005	.005	18	.006	.005
55	.005	.005	17	.006	.005
50	.005	.005	16	.006	.005
45	.005	.005	15	.006	.005
40	.005	.006	14	.006	.005
36	.005	.005	13	.007	.005
35	.005	.005	12	.006	.005
34	.005	.005	11	.005	.005
33	.005	.005	10	.006	.005
32	.005	.005	9	.005	.006
31	.005	.004	8	.006	.006
30	.005	.005	7	.006	.006
29	.005	.005	6	.006	.006
28	.005	.005	5	.006	.006
27	.005	.005	4	.006	.006
26	.005	.005	3	.006	.006
25	.005	.005	2	.006	.006
24	.005	.005	1	.005	.005
23	.005	.005	M	.005	.004

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
56.80	56.50

TABLE 12 (Continued)GROOVES

<u>Distance from Muzzle (inches)</u>	<u>Reading (inches) Point Up</u>	<u>Distance from Muzzle (inches)</u>	<u>Reading (inches) Point Up</u>	<u>Distance from Muzzle (inches)</u>	<u>Reading (inches) Point Up</u>
232.32	54370	195	54093	35	54102
231.32	.360	194	.093	34	.102
230.32	.347	193	.093	33	.102
229.32	.162	192	.093	32	.102
228.32	.156	191	.092	31	.102
227.01	.147	190	.092	30	.102
226.01	.132	185	.092	29	.102
225.01	.121	180	.093	28	.102
224.01	.102	175	.093	27	.102
223.01	.095	170	.093	26	.102
222.01	.093	165	.094	25	.102
221.01	.094	160	.093	24	.102
220.01	.094	155	.094	23	.102
219.01	.095	150	.095	22	.102
218.01	.095	145	.096	21	.102
217.01	.096	140	.097	20	.102
216.01	.096	135	.098	19	.102
215.01	.096	130	.098	18	.102
214	.096	125	.098	17	.102
213	.097	120	.099	16	.102
212	.096	115	.100	15	.102
211	.096	110	.100	14	.102
210	.096	105	.100	13	.102
209	.096	100	.101	12	.102
208	.097	95	.101	11	.102
207	.097	90	.101	10	.102
206	.098	85	.101	9	.102
205	.098	80	.102	8	.102
204	.097	75	.101	7	.102
203	.097	70	.102	6	.102
202	.095	65	.102	5	.103
201	.095	60	.102	4	.103
200	.095	55	.103	3	.103
199	.095	50	.103	2	.103
198	.095	45	.103	1	.103
197	.095	40	.103	M	.105
196	.094	36	.102		

TABLE 13

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182.

Date: 21 October 1955 ESR: 1317.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	5#268	5#268	200	4#995	4#996
231.32	.257	.257	199	.995	.996
230.32	.233	.232	198	.995	.996
229.32	.158	.156	197	.995	.996
228.32	.133	.137	196	.995	.996
227.01	.123	.122	195	.995	.996
226.01	.110	.112	194	.995	.996
225.01	.095	.096	193	.995	.996
224.01	.083	.084	192	.995	.996
223.01	.075	.076	191	.995	.996
222.01	.067	.068	190	.995	.996
221.01	.059	.060	185	.995	.995
220.01	.050	.049	180	.994	.995
219.01	.039	.039	175	.994	.995
218.01	.030	.029	170	.994	.995
217.01	.020	.020	165	.995	.995
216.01	.010	.011	160	.995	.995
215.01	.005	.005	155	.995	.995
214	.002	.002	150	.997	.997
213	.000	.001	145	.997	.997
212	.000	.000	140	.998	.998
211	4#998	.000	135	.998	.998
210	.997	4#999	130	.998	.999
209	.997	.998	125	.998	.999
208	.997	.998	120	.998	.999
207	.996	.998	115	.998	5#000
206	.996	.997	110	.999	.000
205	.996	.997	105	5#000	.001
204	.996	.997	100	.000	.001
203	.996	.996	95	.001	.002
202	.996	.996	90	.002	.002
201	.995	.996	85	.003	.003

TABLE 13 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	57003	57004	22	57005	57006
75	.003	.004	21	.005	.006
70	.004	.004	20	.005	.006
65	.005	.005	19	.005	.006
60	.005	.005	18	.005	.006
55	.005	.005	17	.006	.006
50	.005	.005	16	.006	.006
45	.005	.005	15	.006	.006
40	.005	.005	14	.006	.006
36	.005	.005	13	.006	.006
35	.005	.005	12	.006	.006
34	.005	.005	11	.006	.006
33	.005	.005	10	.006	.006
32	.005	.005	9	.006	.006
31	.005	.005	8	.006	.006
30	.005	.005	7	.006	.006
29	.005	.005	6	.006	.006
28	.005	.005	5	.006	.006
27	.005	.006	4	.006	.006
26	.005	.006	3	.005	.005
25	.005	.006	2	.005	.005
24	.005	.006	1	.005	.005
23	.005	.006	M	.005	.004

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
57.75	57.30

TABLE 13 (Continued)

<u>GROOVES</u>					
<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>
232.32	57268	195	57093	35	57101
231.32	.256	194	.093	34	.101
230.32	.244	193	.093	33	.101
229.32	.167	192	.093	32	.101
228.32	.155	191	.092	31	.101
227.01	.148	190	.092	30	.101
226.01	.138	185	.091	29	.101
225.01	.124	180	.091	28	.101
224.01	.110	175	.091	27	.101
223.01	.087	170	.092	26	.101
222.01	.089	165	.092	25	.101
221.01	.089	160	.092	24	.101
220.01	.090	155	.094	23	.101
219.01	.090	150	.095	22	.101
218.01	.090	145	.095	21	.101
217.01	.091	140	.096	20	.101
216.01	.091	135	.097	19	.101
215.01	.091	130	.097	18	.101
214	.092	125	.097	17	.101
213	.092	120	.097	16	.101
212	.092	115	.098	15	.101
211	.092	110	.098	14	.101
210	.092	105	.098	13	.101
209	.092	100	.099	12	.101
208	.092	95	.099	11	.101
207	.092	90	.100	10	.101
206	.092	85	.100	9	.101
205	.092	80	.100	8	.101
204	.092	75	.100	7	.101
203	.092	70	.100	6	.101
202	.092	65	.100	5	.101
201	.092	60	.100	4	.101
200	.092	55	.100	3	.101
199	.092	50	.100	2	.101
198	.092	45	.101	1	.102
197	.092	40	.101	M	.102
196	.093	36	.101		

TABLE 14

STAR GAUGE DATA,
5"/54 GUN MK 18 MOD 0 SERIAL 16182

Date: 5 January 1956 ESR: 1338.22

LANDS

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
232.32	54259	54268	200	48997	48997
231.32	.258	.257	199	.997	.997
230.32	.238	.238	198	.997	.997
229.32	.159	.157	197	.997	.997
228.32	.138	.140	196	.996	.997
227.01	.125	.126	195	.996	.996
226.01	.112	.112	194	.996	.996
225.01	.097	.100	193	.996	.996
224.01	.085	.086	192	.996	.996
223.01	.078	.077	191	.996	.997
222.01	.070	.070	190	.996	.997
221.01	.062	.060	185	.996	.996
220.01	.051	.048	180	.996	.995
219.01	.043	.038	175	.996	.996
218.01	.031	.027	170	.996	.995
217.01	.023	.018	165	.995	.995
216.01	.012	.011	160	.995	.995
215.01	.006	.005	155	.997	.995
214	.003	.002	150	.997	.996
213	.002	.001	145	.997	.996
212	.000	.000	140	.997	.997
211	.000	.000	135	.998	.998
210	48999	48999	130	.999	.998
209	.999	.999	125	.999	.998
208	.999	.999	120	.999	.999
207	.998	.998	115	54000	54000
206	.998	.998	110	.000	.000
205	.998	.997	105	.000	.000
204	.998	.997	100	.002	.001
203	.997	.997	95	.003	.002
202	.997	.997	90	.003	.002
201	.997	.997	85	.004	.004

TABLE 14 (Continued)

Distance from Muzzle (inches)	Reading (inches)		Distance from Muzzle (inches)	Reading (inches)	
	Point Up	Point Down		Point Up	Point Down
80	57004	57004	22	57006	57006
75	.005	.004	21	.007	.007
70	.006	.005	20	.007	.007
65	.006	.006	19	.007	.007
60	.006	.006	18	.007	.007
55	.006	.005	17	.007	.007
50	.006	.005	16	.007	.007
45	.006	.006	15	.007	.007
40	.006	.007	14	.007	.007
36	.006	.006	13	.007	.007
35	.006	.006	12	.007	.007
34	.006	.006	11	.007	.006
33	.006	.006	10	.007	.006
32	.006	.006	9	.007	.007
31	.006	.006	8	.007	.007
30	.006	.006	7	.007	.007
29	.006	.006	6	.007	.007
28	.005	.006	5	.007	.006
27	.005	.006	4	.007	.006
26	.005	.006	3	.007	.006
25	.006	.006	2	.006	.006
24	.006	.006	1	.006	.005
23	.006	.006	M	.005	.005

Mk 2 Erosion Gauge Seating Distance (in inches):

Point Up	Point Down
57.65	57.40

TABLE 14 (Continued)GROOVES

<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>	<u>Distance</u> <u>from</u> <u>Muzzle</u> <u>(inches)</u>	<u>Reading</u> <u>(inches)</u> <u>Point</u> <u>Up</u>
232.32	57269	195	57091	35	57100
231.32	.258	194	.091	34	.100
230.32	.245	193	.091	33	.100
229.32	.170	192	.091	32	.100
228.32	.150	191	.091	31	.100
227.01	.146	190	.091	30	.100
226.01	.133	185	.091	29	.100
225.01	.118	180	.091	28	.100
224.01	.107	175	.091	27	.100
223.01	.091	170	.091	26	.100
222.01	.091	165	.092	25	.100
221.01	.091	160	.093	24	.100
220.01	.091	155	.094	23	.100
219.01	.092	150	.094	22	.100
218.01	.092	145	.095	21	.100
217.01	.092	140	.096	20	.100
216.01	.092	135	.096	19	.100
215.01	.093	130	.098	18	.101
214	.093	125	.098	17	.101
213	.093	120	.098	16	.101
212	.093	115	.098	15	.101
211	.094	110	.097	14	.101
210	.094	105	.099	13	.101
209	.094	100	.099	12	.101
208	.094	95	.100	11	.101
207	.094	90	.100	10	.101
206	.094	85	.100	9	.101
205	.094	80	.100	8	.101
204	.094	75	.100	7	.101
203	.094	70	.100	6	.101
202	.094	65	.100	5	.101
201	.094	60	.100	4	.101
200	.093	55	.100	3	.101
199	.093	50	.100	2	.101
198	.093	45	.100	1	.101
197	.092	40	.100	M	.101
196	.092	36	.100		

APPENDIX B

TABLE 155"/54 CALIBER BARREL MK 18 MOD O NO. 16182

Unbiased Velocity Variances

<u>Type Fire</u>	<u>Powder Index</u>	<u>Rounds</u>	<u>s²</u>
Date: 6 April 1955			
Slow	IHBF-26FNA	7-11	43
Slow	IHBF-24NA	13-17	42
Rapid	IHBF-26FNA	18-37	26
Date: 12 April 1955			
Rapid	IHBF-26FNA	39-58	107
Rapid	IHBF-26FNA	59-78	32
Rapid	IHBF-26FNA	79-98	81
Rapid	IHBF-26FNA	99-118	23
Rapid	IHBF-26FNA	119-138	71
Slow	IHBF-26FNA	139-143	84
Slow	IHBF-24NA	145-149	6
Date: 28 April 1955			
Slow	IHBF-24NA	151-155	31
Slow	IHBF-26FNA	157-161	11
Rapid	IHBF-26FNA	163-181	43
Rapid	IHBF-26FNA	182-201	58
Rapid	IHBF-26FNA	202-217	76
Rapid	IHBF-26FNA	218-241	97
Rapid	IHBF-26FNA	242-249	58
Rapid	IHBF-26FNA	250-260	29
Slow	IHBF-26FNA	262-266	113
Date: 15 June 1955			
Slow	IHBF-24NA	274-278	20
Slow	IHBF-26FNA	280-284	6
Rapid	IHBF-26FNA	285-304	78
Rapid	IHBF-26FNA	305-314	94
Rapid	IHBF-26FNA	315-344	51
Rapid	IHBF-26FNA	345-364	44
Rapid	IHBF-26FNA	365-382	85
Slow	IHBF-26FNA	384-388	3
Slow	IHBF-24NA	390-394	15

TABLE 15 (Continued)

<u>Type Fire</u>	<u>Powder Index</u>	<u>Rounds</u>	<u>S²</u>
Date: 29 June 1955			
Slow	IHBF-24NA	396-400	21
Slow	IHBF-26FNA	402-406	4
Rapid	IHBF-26FNA	407-424	41
Rapid	IHBF-26FNA	425-426	145
Rapid	IHBF-26FNA	427-446	16
Rapid	IHBF-26FNA	447-466	20
Rapid	IHBF-26FNA	467-486	13
Rapid	IHBF-26FNA	487-506	45
Slow	IHBF-26FNA	507-511	14
Slow	IHBF-24NA	513-517	16

Date: 28 July 1955

Slow	IHBF-24NA	519-523	8
Slow	IHBF-26FNA	525-529	9
Rapid	IHBF-26FNA	530-536	29
Rapid	IHBF-26FNA	537-549	37
Rapid	IHBF-26FNA	550-569	21
Rapid	IHBF-26FNA	570-589	33
Rapid	IHBF-26FNA	590-609	114
Rapid	IHBF-26FNA	610-628	50
Slow	IHBF-26FNA	630-634	11
Slow	IHBF-24NA	636-640	9

Date: 11 August 1955

Slow	IHBF-24NA	642-646	5
Slow	IHBF-26FNA	648-652	5
Rapid	IHBF-26FNA	653-672	61
Rapid	IHBF-26FNA	673-692	32
Rapid	IHBF-26FNA	693-712	26
Rapid	IHBF-26FNA	713-732	45
Rapid	IHBF-26FNA	733-752	52
Slow	IHBF-26FNA	753-757	2
Slow	IHBF-24NA	759-763	21

Date: 19 August 1955

Slow	IHBF-24NA	765-769	70
Slow	IHBF-26FNA	771-775	7
Rapid	IHBF-26FNA	776-795	78

TABLE 15 (Continued)

<u>Type Fire</u>	<u>Powder Index</u>	<u>Rounds</u>	<u>s²</u>
Date: 19 August 1955 (Continued)			
Rapid	IHBF-26FNA	796-815	50
Rapid	IHBF-26FNA	816-835	74
Rapid	IHBF-26FNA	836-855	83
Rapid	IHBF-26FNA	856-875	50
Slow	IHBF-26FNA	876-880	17
Slow	IHBF-24NA	882-886	8
Date: 26 August 1955			
Slow	IHBF-24NA	888-892	3
Slow	IHBF-26FNA	894-898	2
Rapid	IHBF-26FNA	899-918	111
Rapid	IHBF-26FNA	919-938	20
Rapid	IHBF-26FNA	939-958	31
Rapid	IHBF-26FNA	959-978	98
Rapid	IHBF-26FNA	979-998	97
Slow	IHBF-26FNA	999-1003	24
Slow	IHBF-24NA	1005-1009	10
Date: 29 August 1955			
Slow	IHBF-24NA	1011-1015	27
Slow	IHBF-26FNA	1017-1021	46
Rapid	IHBF-26FNA	1022-1041	87
Rapid	IHBF-26FNA	1042-1061	32
Rapid	IHBF-26FNA	1062-1081	62
Rapid	IHBF-26FNA	1082-1101	22
Rapid	IHBF-26FNA	1102-1121	49
Slow	IHBF-26FNA	1122-1126	17
Slow	IHBF-24NA	1128-1132	10
Date: 28 September 1955			
Slow	IHBF-24NA	1134-1138	5
Slow	IHBF-26FNA	1140-1144	15.
Rapid	IHBF-26FNA	1145-1164	74

TABLE 15 (Continued)

<u>Type Fire</u>	<u>Powder Index</u>	<u>Rounds</u>	<u>s²</u>
Date: 20 October 1955			
Slow	IHBF-24NA	1191-1195	38
Slow	IHBF-26FNA	1197-1201	51
Rapid	IHBF-26FNA	1202-1221	131
Rapid	IHBF-26FNA	1222-1241	47
Rapid	IHBF-26FNA	1242-1250	153
Rapid	IHBF-26FNA	1252-1253	2
Rapid	IHBF-26FNA	1254-1261	137
Rapid	IHBF-26FNA	1262-1281	49
Rapid	IHBF-26FNA	1282-1301	122
Slow	IHBF-26FNA	1302-1306	33
Slow	IHBF-24NA	1308-1312	20
Date: 21 December 1955			
Rapid	IHBF-26FNA	1314-1333	53

APPENDIX C

TABLE 16

BARREL LIFE TEST OF 5"/54 GUN MK 18 MOD 0 SERIAL 16182

Summary of Results of Test Conducted on 6 April 1955

(Summary of NAVPROV Ranging Data Sheet No. 6039-459 of 6 April 1955) (Corrected Copy)

Slow fire cold gun erosion check and rapid fire life test.

Gun: 5"/54 Cal. Mk 18 Mod 0 Ser 16182 Actual rounds before test: 5 ESR before test: 10.22 Δ Do before test: 07004
 Gun Elevation: 15° Actual rounds after test: 37 ESR after test: 42.22 Δ Do after test: 07010
 Amb. Temp.: 68°F

Rounds	Proj. Mk - Mod	Fuze Mk - Mod	Charge Weight (lbs.)	Powder Index	Muzzle Velocity (f/s)	Pressure (psi)	Uncorr. Range (Yds.)	Corr. Range (Yds.)	Uncorr. D/R (%)	Corr. D/R (%)
2-6	41-0	SNP	20.02	IHEF-26FNA	2653±5	20.0±.2	16569±99	16346±106	0.60	0.65
8-12	41-0	SNP	19.71	IHEF-24NA	2670±4	19.7±.5	16954±103	16598±74	0.61	0.45
13-32	41-0	73-0	20.02	IHEF-26FNA	2659±3		117074		.052	
							S16697			

Fuze Action, Rds. 13-32: 10 Normal, 6 Early Premature, 2 Late Premature, 2 Dud.

L - Longest range of rapid fire burst.

S - Shortest range of rapid fire burst.

TABLE 17

BARREL LIFE TEST OF 5*/54 GUN MK 18 MOD 0 SERIAL 16182Summary of Results of Test Conducted on 12 April 1955

(Summary of NAVPROV Ranging Data Sheet No. 6040-460 of 12 April 1955)

Rapid fire life test and slow fire hot gun erosion check.

Gun: 5*/54 Cal. Mk 18 Mod 0 Ser 16182 Actual rounds before test: 37 ESR before test: 42.22 Δ Do before test: 0.010
 Gun Elevation: 15° Actual rounds after test: 149 ESR after test: 154.22 Δ Do after test: 0.020
 Amb. Temp.: 65°F

Rounds	Proj. Mk - Mod	Fuze Mk - Mod	Charge Weight (lbs.)	Powder Index	Muzzle Velocity (f/s)	Pressure (tsi)	Uncorr. Range (Yds.)	Corr. Range (Yds.)	Uncorr. D/R (%)	Corr. D/R (%)
2-21	41-0	SNP	20.02	IHBF-26FNA	2641±7		L16554 S16074		0.61	
22-41	41-0	SNP	20.02	IHBF-26FNA	2638±4		L16490 S16109		0.49	
42-61	41-0	SNP	20.02	IHBF-26FNA	2638±6		L16530 S16052		0.61	
62-81	41-0	SNP	20.02	IHBF-26FNA	2644±4		L16542 S16225		0.40	
82-101	41-0	73-0	20.02	IHBF-26FNA	2650±8		L16628 S16149		0.61	
102-106	41-0	SNP	20.02	IHBF-26FNA	2648±7	19.1±.2	L6367±90	16415±59	0.55	0.36
108-112	41-0	SNP	19.71	IHBF-26FNA	2660±2	19.3±.3	L6554±34	16508±36	0.21	0.22

Fuze Action Rds. 82-101; 18 Normal, 2 Dud.

TABLE 18

BARREL LIFE TEST OF 5"/54 GUN MK 18 MOD 0 SERIAL 16182

Summary of Results of Test Conducted on 28 April 1955

(Summary of NAVPROV Ranging Data Sheet No. 6048-463 of 28 April 1955)

Slow fire cold gun erosion check, rapid fire life test and slow fire hot gun erosion check.

Gun: 5"/54 Cal. Mk 18 Mod 0 Ser 16182 Actual rounds before test: 1149 ESR before test: 154.22 ΔDo before test: 08020
 Gun Elevation: 15° Actual rounds after test: 272 ESR after test: 277.22 ΔDo after test: 08026
 Amb. Temp.: 65°F

Rounds	Proj. Mk - Mod	Fuze Mk - Mod	Charge Weight (lbs.)	Powder Index	Muzzle Velocity (f/s)	Pressure (psi)	Uncorr. Range (Yds.)	Corr. Range (Yds.)	Uncorr. D/R (%)	Corr. D/R (%)
2-6	41-0	SNP	19.71	IHBF-24NA	2659±5	19.3±.3	16605±64	16563±69	0.39	0.42
8-12	41-0	SNP	20.02	IHBF-26FNA	2650±3	19.3±.2	16394±52	16422±47	0.32	0.29
13	41-0	73-0	20.02	IHBF-26FNA	2644	-	16467	16225	-	-
14-32	41-0	73-0	20.02	IHBF-26FNA	2652±4	-	-	-	0.35	-
33-52	41-0	SNP	20.02	IHBF-26FNA	2635±6	-	-	-	0.49	-
53-68	41-0	SNP	20.02	IHBF-26FNA	2630±7	-	-	-	0.74	-
69-92	41-0	SNP	20.02	IHBF-26FNA	2635±7	-	-	-	0.39	-
93-100	41-0	73-0	20.02	IHBF-26FNA	2649±2	-	-	-	0.75	-
101-111	41-0	73-0	20.02	IHBF-26FNA	2642±2	-	-	-	0.37	-
112	41-0	73-0	20.02	IHBF-26FNA	-	-	16466	-	-	-
113-117	41-0	SNP	20.02	IHBF-26FNA	2641±8(c)	18.6±.1	16312±116	16560±26(c)	0.71	0.16(c)
119-123	41-0	SNP	19.71	IHBF-24NA	-	18.8±.2	16360±110	-	0.67	-

(c) Based on 2 rounds.

Fuze Action Rds. 13-32: 15 Normal, 3 Early Premature, 2 Dud.
 Rds. 93-112: 15 Normal, 4 Early Premature, 1 Dud.

CONFIDENTIAL

BARREL LIFE TEST OF 5"/54 GUN MK 18 MOD 0 SERIAL 16182

Summary of Results of Test Conducted on 15 June 1955

(Summary of NAVPROV Ranging Data Sheet No. 6055-165 of 15 June 1955)

Slow fire cold gun erosion check, rapid fire life test and slow fire hot gun erosion check.

Gun: 5*/54 Cal. Mk 18 Mod 0 Ser 16182
Gun Elevation: 15°
Amb. Temp.: 73°F

<u>Rounds</u>	<u>Proj. Mk - Mod</u>	<u>Fuze Fk - Mod</u>	<u>Charge Weight (lbs.)</u>	<u>Powder Index</u>	<u>Muzzle Velocity (f/s)</u>	<u>Pressure (tsi)</u>	<u>Uncorr. Range (Yds.)</u>	<u>Corr. D/R (%)</u>
2-6	41-0	SNP	19.71	IHEF-24NA	2691±3	20.2±.5	16411±13	0.08
8-12	41-0	SNP	20.02	IHEF-26FNA	2666±2	19.9±.4	16344±103	0.63
13-32	41-0	73-0	20.02	IHEF-26FNA	2655±6		116635	
							16453	0.24
							116574	0.36
33-42	41-0	SNP	20.02	IHEF-26FNA	2655±8		16331	
							116597	0.49
43-72	41-0	SNP	20.02	IHEF-26FNA	2650±6		16180	
							116530	
73-91 and	41-0	SNP	20.02	IHEF-26FNA	2651±5		16158	
92	41-0	73-0	20.02	IHEF-26FNA	2670		116574	
93-110	41-0	73-0	20.02	IHEF-26FNA	2646±7		16272	
							16207	
111	41-0	73-0	20.02	IHEF-26FNA	2633		16333±122	0.75
112-116	41-0	SNP	20.02	IHEF-26FNA	2657±1	19.8±.2	16465±113	
118-122	41-0	SNP	19.71	IHEF-24NA	2668±3	19.7±.3	16416±46	0.28

Fuze Action Rds. 13-32: 14 Normal, 4 Early Premature, 1 Late Premature, 1 Dud.
Rds. 92-111: 17 Normal, 2 Early Premature, 1 Late Premature.

TABLE 20

BARREL LIFE TEST OF 5"/54 GUN MK 18 MOD 0 SERIAL 16182

Summary of Results of Test Conducted on 29 June 1955

(Summary of NAVPROV Ranging Data Sheet No. 6057-467 of 29 June 1955)

Slow fire cold gun erosion check, rapid fire life test and slow fire hot gun erosion check.

Guns: 5"/54 Cal. Mk 18 Mod 0 Ser 16182 Actual rounds before test: 394 ESR before test: 399.22 ΔDo before test: 09031
 Gun Elevation: 15° Actual rounds after test: 517 ESR after test: 522.22 ΔDo after test: 09066
 Amb. Temp.: 83°F

Rounds	Proj. Mk - Mod	Fuse Mk - Mod	Charge Weight (lbs.)	Powder Index	Muzzle Velocity (f/s)	Pressure (tsi)	Uncorr. Range (Yds.)	Corr. Range (Yds.)	Uncorr. D/R (%)	Corr. D/R (%)
2-6	41-0	SNP	19.71	IHBF-24NA	2683±3	21.3±.3	16749±116	16239±88	0.69	0.54
8-12	41-0	SNP	20.02	IHBF-26FNA	2669±1	21.0±.8	16572±23	16171±15	0.14	0.09
13-30	41-0	73-0	20.02	IHBF-26FNA	2673±3		116743		0.40	
31-32	41-0	73-0	20.02	IHBF-26FNA	2673±4		S16492			
33-52	41-0	SNP	20.02	IHBF-26FNA	2663±3		L16581		0.02	
53-72	41-0	SNP	20.02	IHBF-26FNA	2663±4		S16574		0.57	
73-92	41-0	SNP	20.02	IHBF-26FNA	2660±4		L16664		0.62	
93-112	41-0	73-0	20.02	IHBF-26FNA	2661±4		S16214		0.62	
113-117	41-0	SNP	20.02	IHBF-26FNA	2660±3		L16612		0.53	
119-123	41-0	SNP	19.71	IHBF-24NA	2665±3	20.5±.4	L16632	16116±34	0.19	0.21
						20.3±.2	S16236	16020±59	0.45	0.37

Fuze Action Rds. 13-32: 8 Normal, 10 Early Premature, 2 Dud.
 Rds. 93-112: 16 Normal, 3 Early Premature, 1 Late Premature.

TABLE 21

BARREL LIFE TEST OF 5"/54 GUN MK 18 MOD 0 SERIAL 16182

Summary of Results of Test Conducted on 28 July 1955

(Summary of NAVPROV Ranging Data Sheet No. 6063-470 of 28 July 1955)

Slow fire cold gun erosion check, rapid fire life test and slow fire hot gun erosion check.

Rounds		Proj. Mk - Mod	Fuse Mk - Mod	Charge Weight (lbs.)	Powder Index	Muzzle Velocity (f/s)	Pressure (psi)	Uncorr. Range (Yds.)	Corr. Range (Yds)	Uncorr. D/R (%)	Corr. D/R (%)
2-6	41-0	SNP	SNP	19.71	IHF-24NA	2679±2	20.8±.4(a)	16979±48	16416±42	0.28	0.26
8-12	41-0	SNP	SNP	20.02	IHF-26FNA	2671±2	21.2±.5(a)	16869±63	16385±58	0.37	0.35
13-19	41-0	73-0	73-0	20.02	IHF-26FNA	2675±4		116994		0.28	
20-32	41-0	73-0	73-0	20.02	IHF-26FNA	2673±4		SL6819		0.38	
33-52	41-0	SNP	SNP	20.02	IHF-26FNA	2666±4		SL6775		0.47	
53-72	41-0	SNP	SNP	20.02	IHF-26FNA	2667±5		SL6907		0.35	
73-92	41-0	SNP	SNP	20.02	IHF-26FNA	2657±7		SL6532		0.53	
93-111	41-0	73-0	73-0	20.02	IHF-26FNA	2657±4		SL6567		0.53	
112	41-0	73-0	73-0	20.02	IHF-26FNA	2663		SL6760			
113-117	41-0	SNP	SNP	20.02	IHF-26FNA	2637±3		SL6340			
119-123	41-0	SNP	SNP	19.71	IHF-24NA	2644±2		SL6830			
								SL6433			
								16846			
								16617±36	16388±30	0.22	0.18
								16742±53	16460±61	0.32	0.37

(a) Based on 4 rounds.

Fuse Action Rds. 13-32: 18 Normal, 1 Early Premature, 1 Dud.
 Rds. 93-112: 15 Normal, 3 Early Premature, 1 Late Premature, 1 Dud.

TABLE 22

BARREL LIFE TEST OF 5"/54 GUN MK 18 MOD 0 SERIAL 16182

CONFIDENTIAL

NPG REPORT NO. 1532

Summary of Results of Test Conducted on 11 August 1955

(Summary of NAVPROV Ranging Data Sheet No. 6064-471 of 11 August 1955)

Slow fire cold gun erosion check, rapid fire life test and slow fire hot gun erosion check.

Gun: 5"/54 Cal. Mk 18 Mod 0 Ser 16182 Actual rounds before test: 640 ESR before test: 645.22 Δ Do before test: 0.083
 Gun Elevation: 15° Actual rounds after test: 763 ESR after test: 768.22 Δ Do after test: 0.096
 Amb. Temp.: 80°F

Rounds	Proj. Mk - Mod	Fuse Mk - Mod	Charge Weight (lbs.)	Powder Index	Muzzle Velocity (f/s)	Pressure (tsi)	Uncorr. Range (Yds.)	Corr. Range (Yds)	Uncorr. D/R (%)	Corr. D/R (%)
2-6	41-0	SNP	19.71	IHBF-24NA	2651±2	19.6±.3	16450±58	16265±45	0.35	0.28
8-12	41-0	SNP	20.02	IHBF-26FNA	2649±2	19.8±.4	16438±47	16267±72	0.29	0.26
13-32	41-0	73-0	20.02	IHBF-26FNA	2654±7		116673		0.35	
33-52	41-0	SNP	20.02	IHBF-26FNA	2637±4		SI6413		0.66	
53-72	41-0	SNP	20.02	IHBF-26FNA	2632±4		116517		0.49	
73-92	41-0	SNP	20.02	IHBF-26FNA	2627±5		SI6561		0.62	
93-112	41-0	73-0	20.02	IHBF-26FNA	2632±5		SI6176		0.54	
113-117	41-0	SNP	20.02	IHBF-26FNA	2627±1	19.0±.1	SI5964	16263±56	0.34	0.36
119-123	41-0	SNP	19.71	IHBF-24NA	2628±4	18.5±.4	116469	16264±98	0.74	0.60
							SI6059			
							16266±121			

Fuse Action Rds. 13-32: 13 Normal, 2 Early Premature, 4 Late Premature, 1 Dud.
 Rds. 93-112: 11 Normal, 1 Early Premature, 2 Late Premature, 3 Dud.

TABLE 23

BARREL LIFE TEST OF 5"/54 GUN MK 18 MOD 0 SERIAL 16182

Summary of Results of Test Conducted on 19 August 1955

(Summary of NAVPROV Ranging Data Sheet No. 6066-472 of 19 August 1955)

Slow fire cold gun erosion check, rapid fire life test and slow fire hot gun erosion check.

Gun: 5"/54 Cal. Mk 18 Mod 0 Ser 16182 Actual rounds before test: 763 ESR before test: 768.22 Do before test: OM096
 Gun Elevation: 15° Actual rounds after test: 886 ESR after test: 891.22 ΔDo after test: OM103
 Amb. Temp.: 86°F

Rounds	Proj. Mk - Mod	Fuze Mk - Mod	Charge Weight (lbs.)	Powder Index	Muzzle Velocity (f/s)	Pressure (tsi)	Uncorr. Range (Yds.)	Corr. Range (Yds.)	Uncorr. D/R (%)	Corr. D/R (%)
2-6	41-0	SNP	19.71	IHEF-2LNA	2633±6	18.1±.1	16525±68	16275±86	0.41	0.53
8-12	41-0	SNP	20.02	IHEF-26FNA	2626±2	18.5±.2	16525±58	16332±41	0.35	0.25
13-32	41-0	73-0	20.02	IHEF-26FNA	2635±6		116736		0.34	
33-52	41-0	SNP	20.02	IHEF-26FNA	2623±6		SI6477		0.46	
53-72	41-0	SNP	20.02	IHEF-26FNA	2620±6		SI6245		0.46	
73-92	41-0	SNP	20.02	IHEF-26FNA	2615±7		SI6262		0.56	
93-112	41-0	73-0	20.02	IHEF-26FNA	2622±5		SI6036		0.69	
113-117	41-0	SNP	20.02	IHEF-26FNA	2607±3	18.0±.1	SI6115	16210±74	0.52	0.46
119-123	41-0	SNP	19.71	IHEF-2LNA	2610±2	17.7±.2	16257±84	16303±79	0.37	0.48
							16368±61			

Fuze Action Rds. 13-32: 15 Normal, 2 Early Premature, 2 Late Premature, 1 Dud.
 Rds. 93-112: 15 Normal, 2 Early Premature, 1 Late Premature, 2 Dud.

TABLE 24

BARREL LIFE TEST OF 5"/54 GUN MK 18 MOD 0 SERIAL 16182

Summary of Results of Test Conducted on 26 August 1955

(Summary of NAVPROV Ranging Data Sheet No. 6068-473 of 26 August 1955)

Slow fire cold gun erosion check, rapid fire life test and slow fire hot gun erosion check.

Gun: 5"/54 Cal. Mk 18 Mod 0 Ser 16182 Actual rounds before test: 886 ESR before test: 891.22 Do before test: 08103
 Gun Elevation: 15° Actual rounds after test: 1009 ESR after test: 1014.22 Do after test: 08111
 Amb. Temp.: 77°F

Rounds	Proj. Mk - Mod	Fuze Mk - Mod	Charge Weight (lbs.)	Powder Index	Muzzle Velocity (f/s)	Pressure (tsi)	Uncorr. Range (Yds.)	Corr. Range (Yds)	Uncorr. D/R (%)	Corr. D/R (%)
2-6	41-0	SNP	19.71	IHBF-24NA	2627±1	18.8±.2	16194±24	16347±21	0.15	0.13
8-12	41-0	SNP	20.02	IHBF-26FNA	2624±1	18.8±.2(a)	16102±36	16280±36	0.22	0.22
13-32	41-0	73-0	20.02	IHBF-26FNA	2622±8		116350		0.38	
33-52	41-0	SNP	20.02	IHBF-26FNA	2604±3		SI6056		0.41	
53-72	41-0	SNP	20.02	IHBF-26FNA	2600±4		SI6166		0.49	
73-92	41-0	SNP	20.02	IHBF-26FNA	2598±7		SI5847		0.68	
93-112	41-0	73-0	20.02	IHBF-26FNA	2610±8		SI6174		0.51	
113-117	41-0	SNP	20.02	IHBF-26FNA	2609±4	18.6±.1	SI5653	16304±32	0.41	0.20
119-123	41-0	SNP	19.71	IHBF-24NA	2610±2	18.2±.2	SI6158	16257±75	0.46	0.46

(a) Based on 4 rounds.

Fuze Action Rds. 13-32: 18 Normal, 1 Early Premature, 1 Dud.

Rds. 93-112: 15 Normal, 2 Early Premature, 1 Late Premature, 2 Dud.

TABLE 25

BARREL LIFE TEST OF 5*/54 GUN MK 18 MOD 0 SERIAL 16182

Summary of Results of Test Conducted on 29 August 1955

(Summary of NAVPROV Ranging Data Sheet No. 6069-474 of 29 August 1955)

Slow fire cold gun erosion check, rapid fire life test and slow fire hot gun erosion check.

Gun: 5*/54 Cal. Mk 18 Mod 0 Ser 16182 Actual rounds before test: 1009 ESR before test: 1014.22 Δ Do before test: 07111
 Gun Elevation: 15° Actual rounds after test: 1132 ESR after test: 1137.22 Δ Do after test: 07116
 Amb. Temp.: 78°F

Rounds	Proj. Mk - Mod	Fuze Mk - Mod	Charge Weight (lbs.)	Powder Index	Muzzle Velocity (f/s)	Pressure (tsi)	Uncorr. Range (Yds.)	Corr. Range (Yds.)	Uncorr. D/R (%)	Corr. D/R (%)
2-6	41-0	SNP	19.71	IHEF-2LNA	2614 $\pm$ 4	18.2 $\pm$.4	16309 $\pm$ 95	16428 $\pm$ 66	0.58	0.40
8-12	41-0	SNP	20.02	IHEF-26FNA	2613 $\pm$ 4	18.6 $\pm$.2	16274 $\pm$ 62	16403 $\pm$ 39	0.38	0.24
13-32	41-0	73-0	20.02	IHEF-26FNA	2617 $\pm$ 8		116394		0.31	
33-52	41-0	SNP	20.02	IHEF-26FNA	2598 $\pm$ 5		116173		0.44	
53-72	41-0	SNP	20.02	IHEF-26FNA	2600 $\pm$ 6		116245		0.41	
73-92	41-0	SNP	20.02	IHEF-26FNA	2592 $\pm$ 4		116284		0.43	
93-112	41-0	73-0	20.02	IHEF-26FNA	2604 $\pm$ 5		116204		0.81	
113-117	41-0	SNP	20.02	IHEF-26FNA	2589 $\pm$ 3	17.7 $\pm$.2	115871	16403	0.45	0.32
119-123	41-0	SNP	19.71	IHEF-2LNA	2593 $\pm$ 2	17.4 $\pm$.2	115837	16369 $\pm$ 52	0.42	0.43
							16048 $\pm$ 72	16386 $\pm$ 43		
							16100 $\pm$ 68			

Fuze Action Rds. 13-32: 13 Normal, 5 Early Premature, 1 Late Premature, 1 Dud.
 Rds. 93-112: 13 Normal, 5 Early Premature, 2 Late Premature.

TABLE 26

BARREL LIFE TEST OF 5" 5/4 GUN MK 18 MOD 0 SERIAL 16182

Summary of Results of Test Conducted on 28 September 1955

(Summary of NAVPROV Ranging Data Sheet No. 6072-475 of 28 September 1955)

Slow fire cold gun erosion check and rapid fire life test.

Gun: 5" 5/4 Cal. Mk 18 Mod 0 Ser 16182 Actual rounds before test: 1132 ESR before test: 1137.22 Δ Do before test: 07116
 Gun Elevation: 15° Actual rounds after test: 1189 ESR after test: 1194.22 Δ Do after test: 07118
 Amb. Temp.: 79°F

Rounds	Proj. Mk - Mod	Fuse Mk - Mod	Charge Weight (lbs.)	Powder Index	Muzzle Velocity (f/s)	Pressure (psi)	Uncorr. Range (Yds.)	Corr. Range (Yds.)	Uncorr. D/R (%)	Corr. D/R (%)
2-6	41-0	SNP	19.71	IHBF-26FNA	2601±2	17.8±.2	16292±42	16412±44	0.26	0.27
8-12	41-0	SNP	20.02	IHBF-26FNA	2599±3	18.0±.4	16130±56	16270±65	0.35	0.40
13-32	41-0	73-0	20.02	IHBF-26FNA	2605±7		116357		0.37	
33-34	42-2	SNP	20.02	IHBF-26FNA	2602±2		S16082		0.60	
35 and 36-45	42-1	SNP	20.02	IHBF-26FNA	2590		S16382			
46 and 47	42-2	SNP	20.02	IHBF-26FNA	2598±6		S16187		2.13	
48-52	42-2	SNP	20.02	IHBF-26FNA	2597		S14982		2.13	
	42-2	SNP	20.02	IHBF-26FNA	2597		S16347		0.30	
	42-2	SNP	20.02	IHBF-26FNA	2600±7		S16250		0.30	
53-56	42-2	SNP	20.02	IHBF-26FNA	2589±6		S16492		0.67	
	42-2	SNP	20.02	IHBF-26FNA	2588		S16136		1.78	
57	42-2	SNP	20.02	IHBF-26FNA	2588		S16180		-	
							S15347			
							16036			

Fuse Action Rds. 13-32: 15 Normal, 3 Early Premature, 2 Dud.

BARREL LIFE TEST OF 5"/54 GUN MK 18 MOD 0 SERIAL 16182

Summary of Results of Test Conducted on 20 October 1955

(Summary of NAVPROV Ranging Data Sheet No. 6075-476 of 20 October 1955)

Slow fire cold gun erosion check, rapid fire life test and slow fire hot gun erosion check.

Gun: 5"/54 Cal. Mk 18 Mod 0 Ser 16182 Actual rounds before test: 1189 ESR before test: 1194.22 ΔDo before test: 07118
Gun Elevation: 15° Actual rounds after test: 1312 ESR after test: 1317.22 ΔDo after test: 07123
Amb. Temp.: 64°F

Rounds	Proj. Mk - Mod	Fuze Mk - Mod	Charge Weight (lbs.)	Powder Index	Muzzle Velocity (f/s)	Pressure (tsi)	Uncorr. Range (Yds.)	Corr. Range (Yds.)	Uncorr. D/R (%)	Corr. D/R (%)
2-6	41-0	SNP	19.71	IHEF-2UNA	2603±4	17.7±.3	15890±131	16407±111	0.82	0.68
8-12	41-0	SNP	20.02	IHEF-26FNA	2598±4	18.1±.2	15794±51	16354±46	0.32	0.28
13-32	41-0	73-0	20.02	IHEF-26FNA	2605±11		115926		0.23	
33-52	41-0	SNP	20.02	IHEF-26FNA	2573±6		115816		0.46	
53-61	41-0	SNP	20.02	IHEF-26FNA	2581±9		115707		0.55	
62	41-0	SNP	20.02	IHEF-26FNA	2572		115365			
63-64	41-0	SNP	20.02	IHEF-26FNA	2568±1		115672		-	
65-72	41-0	SNP	20.02	IHEF-26FNA	2577±9		115335		0.39	
73-92	41-0	SNP	20.02	IHEF-26FNA	2573±5		115507		0.54	
93-112	41-0	73-0	20.02	IHEF-26FNA	2586±8		115388		0.70	
113-117	41-0	SNP	20.02	IHEF-26FNA	2578±5	17.3±.2	115672		0.80	
119-123	41-0	SNP	19.71	IHEF-2UNA	2582±4	17.1±.2	115777		0.43	0.34
							115255	16371±55	0.45	0.41
							115822	16341±67		
							115570			
							15656±68			
							15660±70			

Fuze Action Rds. 13-32: 3 Normal, 2 Early Premature, 1 Late Premature, 1 Dud.
Rds. 93-112: 2 Normal, 3 Early Premature, 15 Late Premature.

TABLE 28

BARREL LIFE TEST OF 5*/54 GUN MK 18 MOD 0 SERIAL 16182

Summary of Results of Test Conducted on 21 December 1955
(Summary of NAVPROV Ranging Data Sheet No. 6087-477 of 21 December 1955)

Gun: 5*/54 Cal. Mk 18 Mod 0 Ser 16182 Actual rounds before test: 1312 ESR before test: 1317.22 Δ Do before test: 07123
Gun Elevation: 15° Actual rounds after test: 1333 ESR after test: 1338.22 Δ Do after test: 07126
Amb. Temp.: 26°F

Rounds	Proj.		Fuze	Charge	Powder	Muzzle	Pressure	Uncorr.		Corr.		Corr.
	Mk - Mod	Mk - Mod		Weight (lbs.)	Index	Velocity (f/s)		Range (Yds.)	Range (Yds.)	D/R (%)	D/R (%)	
2-21	41-0	73-0	20.02	IHB7-26FNA	2587±5	-	115646 515411	-	0.34	-	-	-

Fuze Action Rds. 2-21: 14 Normal, 2 Early Premature, 4 Late Premature.

APPENDIX D

DISTRIBUTION

Bureau of Ordnance:

Ad3	1
ReS3b	1
ReS6b	1
ReS5	1
ReS5a	1

Armed Services Technical Information Agency
Document Service Center
Knott Building
Dayton 2, Ohio

5

Commanding General
Aberdeen Proving Ground
Aberdeen, Maryland
Attn: Technical Information Section
Development and Proof Services

1

Commander, Operational Development Force
U. S. Atlantic Fleet, U. S. Naval Base
Norfolk 11, Virginia

1

Naval Gun Factory

1

Naval Powder Factory

1

Naval Ordnance Laboratory (Fuze Division)

1

Watertown Arsenal
Watertown, Massachusetts

1

Solid Propellant Information Agency
Applied Physics Laboratory
Johns Hopkins University
Silver Spring, Maryland

1

Armed Services Technical Information Agency
Knott Building
Dayton 2, Ohio
Attn: TICSCP

5

Local:

WWI	1
WWIE	1
File	1

CONFIDENTIAL

Naval Proving Ground. (NPG Report No. 1532) BARREL LIFE TEST WITH NACO (NAVY COOL) PROPELLANT OF 5"/54 CALIBER BARREL MK 18 MOD 0 SERIAL NO. 16182, by J. W. Duch. 17 Apr 1957. 8 p. 28 tables. CONFIDENTIAL A lot of 5"/54 NACO (Navy Cool) flashless propellant was evaluated with respect to erosion characteristics in rapid fire schedules. Erosion was reduced by a factor of three relative to the standard pyro powder.	1. NACO propellants 2. Gun barrels - Erosion 3. Gun barrels - 5"/54 Mark 18 1. Duch, J. W. Task: NPG-S5-5e-18-3-56 CONFIDENTIAL
Naval Proving Ground. (NPG Report No. 1532) BARREL LIFE TEST WITH NACO (NAVY COOL) PROPELLANT OF 5"/54 CALIBER BARREL MK 18 MOD 0 SERIAL NO. 16182, by J. W. Duch. 17 Apr 1957. 8 p. 28 tables. CONFIDENTIAL A lot of 5"/54 NACO (Navy Cool) flashless propellant was evaluated with respect to erosion characteristics in rapid fire schedules. Erosion was reduced by a factor of three relative to the standard pyro powder.	1. NACO propellants 2. Gun barrels - Erosion 3. Gun barrels - 5"/54 Mark 18 1. Duch, J. W. Task: NPG-S5-5e-18-3-56 CONFIDENTIAL
Naval Proving Ground. (NPG Report No. 1532) BARREL LIFE TEST WITH NACO (NAVY COOL) PROPELLANT OF 5"/54 CALIBER BARREL MK 18 MOD 0 SERIAL NO. 16182, by J. W. Duch. 17 Apr 1957. 8 p. 28 tables. CONFIDENTIAL A lot of 5"/54 NACO (Navy Cool) flashless propellant was evaluated with respect to erosion characteristics in rapid fire schedules. Erosion was reduced by a factor of three relative to the standard pyro powder.	1. NACO propellants 2. Gun barrels - Erosion 3. Gun barrels - 5"/54 Mark 18 1. Duch, J. W. Task: NPG-S5-5e-18-3-56 CONFIDENTIAL
Naval Proving Ground. (NPG Report No. 1532) BARREL LIFE TEST WITH NACO (NAVY COOL) PROPELLANT OF 5"/54 CALIBER BARREL MK 18 MOD 0 SERIAL NO. 16182, by J. W. Duch. 17 Apr 1957. 8 p. 28 tables. CONFIDENTIAL A lot of 5"/54 NACO (Navy Cool) flashless propellant was evaluated with respect to erosion characteristics in rapid fire schedules. Erosion was reduced by a factor of three relative to the standard pyro powder.	1. NACO propellants 2. Gun barrels - Erosion 3. Gun barrels - 5"/54 Mark 18 1. Duch, J. W. Task: NPG-S5-5e-18-3-56 CONFIDENTIAL