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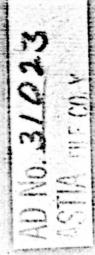




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Aberdeen Proving Ground

MARYLAND

A TEST OF U.S. HI PLE, CALIBER .30, M1

D. A. Project No. 502-08-006

DEVELOPMENT AND PROOF SERVICES

28th Report OCO Project No. T32-2015

Pr

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A TEST OF U. S. RIFLE, CALIBER .30, MI

HEAD QUARTERS

9301 TSU (ORD) CLIMATIC TEST DETACHMENT
Yuma Tost Station
Yuma, Arizona

Authority: ORDTS DA Priority: 10 CGRobinson/jab/ 22 October 1953

A TEST OF U. S. RIFLE, CALIBER .30, MI

TWENTY-EIGHTH REPORT ON PROJECT NO. TS2-2015

DATES OF TEST: 17 August to 7 September 1953

OBJECT

To evaluate functioning performance of weapons, after exposure to desert heat and blowing sand, when prepared with standard and experimental lubricants.

SUMMARY

Two U. S. Rifles, Caliber .30, Ml, were tested with lubricants which were manufactured under MIL-L-644A and NRL E-51 specifications. The Lubricant developed under the NRL E-51 specification was definitely unsatisfactory for the Ml rifle under desert conditions.

CONCLUSIONS

It is concluded that the lubricant which meets the NRL E-51 specification should not be used on the MI rifle when desert conditions exist.

RECOUNTENLATIONS

It is recommended that the lubricant meeting specification HIL-L-644 be used on the U.S. Rifle, caliber .30, Ml for desert operation.

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I. INTRODUCTION

A. DISCUSSION

The original test was to have been a comparative test of the T44, FN, and MI rifles. Since the T44 and FN rifles were not available at the time scheduled for the test, the test was continued with the MI rifle only, and the test was primarily for the purpose of comparing lubricants. The MI rifle used for the test was the standard U. S. Rifle, Caliber .30, M.

B. REFERENCES

- 1. Authority for test (copy attached as Appendix A).
- a. Letter file 00 400.112/1205 APG, APG 400.112/9-288 dated 2 April 1953, Subject: ipproval of the Ordnance Climatic Test Program for Yuma, Arizona for the Summer 1953.
- b. Letter file 00 400.112/875 Aberdeen, dated 16 March 1953, Subject: Approval of Crimance Climatic Test Program, Yuma, Arizona, Summer, 1953.
- c. APG Memorandum from Acting Chief, Arms and Ammunition Division to Chief, Climatic Test Division dated 30 July 1953, Subject: Summer Tests at Yuma, Arizona, 1953.

2. Technical References

- a. Development and Proof Services Sixteenth Report on Project No. TS2-2023; Title: A Test of Wespon Mount, M74, Modified.
- b. Pevelopment and Proof Services Fifteenth Report on Project No. TS2-2023; Title: A Test of Machine Gun, Caliber .30, T153.
 - c. Development and Proof Services Firing Record No. 1479.
 - d. Test Flem.

II. DESCRIPTION OF LETERIE

A. The standard E. S. Rifle, Caliber .30, Ml, is described in War Department Technical Exampl Number TM9-1275.

III. DETAILS OF TEST

A. PROCEDURES

- 1. One of the rifles was thoroughly cleaned and degreased before being oiled lightly with oil, MIL-L-644A. The other rifle was prepared in the same manner except that experimental oil, NRL E-51 was used.
- 2. The two weapons were stored in such a manner that full exposure to outdoor weather conditions resulted. Each weapon was fired twenty rounds on the first day and twenty rounds daily thereafter for a period of ten days. Both weapons were fired from the shoulder.
- 3. The weapons were cleaned and re-oiled and the test repeated. In the repeated phase of the test the weapons were lubricated in such a manner that the one having oil MIL-L-644A for the first phase then had oil NRL E-51 for the repeated phase, to insure that the difference in individual weapon performance was equally distributed for the two types of lubricant.
- 4. Observations included the performance of weapon and ammunition; comfort and convenience in operating weapon under conditions of excessive heat; ease of adjusting sights; vulnerability of various components and assemblies to blowing sand; and evaporation of lubricant. Components were observed which could burn the gunner because of contact with face or hands after gun exposure to direct sunlight.

B. RESULTS '

1. Total number of malfunctions:

	Lubricant						
Serial No. of weapon	MIL-L-644A	NRL E-51	Total				
3470273	. 12	68	80				
1225565	_1	<u> 11</u>	12				
Total	1 13	79	92				

2. Overall operation of those weapons lubricated with the NRL E-51 oil was very unsatisfactory.

C. OBSERVATIONS

- 1. It was observed that the MI rifle is very sensitive to the lubricant under desert conditions as is shown by the summary above.
- 2. When the rifles were disassembled after completing the first cycle it was observed that the one lubricated with the NRL E-51 oil was

completely dry but contained less sand than the one lubricated with MIL-L-6441 oil. An attempt was made to show this in photograph number A91949.

3. It was also observed that the lubricant NRL E-51 allowed more wear on the working parts.

D. OBSESTORS

None

IV. CONCLUSIONS

- A. The imbricant which meets specification NRL E-51 is completely unsatisfactory for use on the U. S. Rifle, Caliber .30, M1 under conditions of exposure to desert summer weather.
- B. Weapon and ammunition performance was satisfactory, although the weapon performance is slightly reduced because of dust entering the trigger mechanism, when proper lubricant was employed.
 - C. We difficulty was encountered with sight adjustments.
- D. Ease and convenience of operation under desert heat was satisfactory.
- E. The labricant NRL E-51 had a very high rate of evaporation as compared to the MIL-L-644A lubricant.

V. RECOMMENTIONS

- A. It is recommended that further test on the U.S. Rifle, Celiber .30, Ml, lubricated with the oil NRL E-51 be discontinued in favor of the oil MIL-L-544, for use under summer desert conditions.
- B. That a method to developed which will raise the boiling point of the NRI-E-A oil without increasing the viscosity. A suggested may of accomplishing this would be by means of chemical additives. If the boiling point could be raised sufficiently without affecting the viscosity, the NRL E-51 lubricant may prove superior to the MIL-L-Silla lubricant.

DIVIEWED BY:

C. M. STRATTOM Lt. Col., Ord Corps

They to Dear

PREPARED BY:

Caroll H. Folian

CARROLL G. ROBINSON
Project Engineer
Southwest Research Institute

APPROVED BY:

for T. F. COLLERAN Director, D&PS SUBMITTED BY:

BENJAMIN S. GOCDWIN Chief, A&A Division



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APPENDICES

- A. Correspondence
- B. Firing Record
- C. Photographs

APPENDIX A

Correspondence

- 1. Letter file 00. 400.112/1205 APG, APG 400.112/9-288 dated 2 April 1953, Subject: Approval of the Ordnance Climatic Test Program for Yuma, Arizona for the Summer of 1953.
- 2. Letter file 00 409.112/875 Aberdeen, dated 16 March 1953, Subject:
 Approval of Ordnance Climatic Test Program, Yuma, Arizona, Summer, 1953.
 - 3. Test Plan.
 - 4. Memorandum from Acting Chief, Arms and Ammunition Division to Chief, Climatic Test Division, Subject: Summer Test at Yuma, Arizona, 1953.

WAR DEPARTMENT

SAZweibel/sz/55827

0.0 400.112/1205 APG

APG 400.112/9-285

OFFICE OF THE CHIEF OF ORDNANCE

OFDTB

WASHINGTON, D. C.

2 April 1953

SUBJECT: Approval of the Ordnance Climatic Test Program for Tuma,

Arizona for the Summer 1953

TO

Commanding General Aberdeen Proving Ground Maryland

ATTN: Development and Proof Services - Climatic Test Division

- 1. Reference is made to letter from this office, file No. 00 400.112/ 875 Aberdeen, dated 16 Merch 1953, subject as above, giving verbal approval of the program.
- 2. Formal approval of the desert test program for the summer of 1953 has been received from the Assistant Chief of Staff, G-4.
- 3. Authorization has been given for direct correspondence with the Commanding Officer, Yuma Test Station on administrative and logistic support and the Chief Signal Officer on meteorological support.

BY COMMAND OF MAJOR GENERAL FORD:

/s/ N. L. Klein N. L. KLEIN Assistant

D

WAR DEPARTMENT
OFFICE OF THE CHIEF OF ORDNANCE
WASHINGTON, D.C.

SZweibel/82/55827

n

To insure prompt attention replying refer to: 0.0. 400.112/875 Aberdeen

16 March 1953

Attention of ORDIB

SUBJECT: Approval of Ordnance Climatic Test Program, Yuma, #1zona, Summer, 1953

TO:

Cornelding General Aberdeen Proving Ground Maryland

ATTN: Climatic Test Division Development and Proof Services

- 1. Forwarded herewith is the Program for the Ordnance Climatic Tests for Tuma, Arizona, for the Summer of 1953, for which verbal approval has been received from Lt Col L. M. Hoover, ACofA, G-4. Formal approval will be forwarded to your office as soon as it has been received.
- 2. The fleet of 15 vehicles marked by astericks (*) will be requisitioned by this office. It is fequested that the necessary requisitioning for the remainder of the equipment be accomplished at the earliest possible date by your office.

BY COMMAND OF MAJOR GENERAL FORD:

1 Incl: Subj Prog (In Dup) /s/ N. L. KLEIN Assistant PROJECT:

PROJECT NO. 1 TS2-2015

PRICEITY: 1C

PROJECT ENGINEER: Robinson

QUANTITY: 2 - Rifle, Light Weight, Cal.

.30, T44

AUTHORITY: ORDIS

2 - Rifle, Light Weigt, CAl.

.30, FH

O.C.M. ITEM:

2 - Rifle, U.S., Cal.. 30, M1

OBJECT OF TEST: To evaluate functioning performance of weapons, after exposure to desert heat and blowing sand, when prepared with standard and experimental lubricants.

SYNOPSIS OF PRESENT SITUATION: Army Field Forces have narrowed the choice of light rifles which might be picked for standardization to the T44 and the FN. Both weapons have given fairly good performances in engineering tests at APG and in field trials at Fort Benning. Early standardization of one of these rifles appears likely.

<u>DESCRIPTION</u>: The T44 and FN rifles were designed to meet Army Field Forces requirements for a light-weight weapon to replace the Ml. Both of these rifles are chambered for the light-rifle cartridgs and have 20-round magazines. Firing can be either semi or full-automatic. The T44 is a further modification of the Ml rifle, hence many of the machine tests available for Ml rifle production could be used to produce it. The distinguishing features of the FN rifle are its ease of field maintenance and its mechanical simplicity.

FACILITIES RECUIRED: The same facilities remired to test the light machine guns can be used.

INSTRUMENTATION REQUIRED: None.

<u>DETAILED TEST PROCEDURE</u>: The same procedure specified for the light machine guns will be employed except that one 20-round magazine will be fired each day, half of the firing to be in full-autometic bursts. The Ml rifle will be the control weapon.

()

Mr. ACTood/pk/2284 DATE: 30 July 1953

TO : Chief, Climatic Test Division

FROM : Acting Chief, Arms and Ammunition Division

SUBJECT: Summer Tests at Yuma Arizona, 1953

It is requested that the following items be deleted from the tests recommended by the Arms and Ammunition Division for summer operations at Yuma this year:

- 1. Light machine gun, Cal. .30 T52
- 2. Light Rifle, Cal. .30 T44
- 3. Light Rifle Cal .30 FN

The above items are being dropped from the program because of their non-availability.

4. Rifle, Recoilless, 57mm, T66E2Al Removed because of design failure in the weapon discovered at Aberdeen in recent tests.

BENJAMIN S. GOODWIN

/s/ ARTHUP C. WOOD

ORDBG-DPS-CTD lst Ind Chief, Climatic Test Division Mr Christopher/lbs/5233

TO: CO, CCTD, Yuma Test Station, Yuma, Arizona, 3 August 1953

For your information and necessary action.

ROBERT G. BLAYLOCK Lt Col Ord Corps

/s/N.C. Christopher
W. C. CHRISTOPHER
Assistant Chief
Climatic Test Division

APPENDIX B

Development and Proof Services Firing Record No. 1479

HEADQUARTERS

9301 TSU (ORD) CLIMATIC TEST DETACHMENT Yuma Test Station Yuma, Arizona

OBJECT OF TEST: To Evaluate Functioning Performance of Weapons, after Exposure to Desert Heat and

Blowing Sand, When Prepared with Standard and Experimental

Lubricants.

DATE OF TEST: 17 Aug thru
7 Sop 1953
FIRING RECORD NO: 1479

SHEET 1 OF 7

WORK ORDER: 14-01

AUTHORITY: OCO letter dated

2 Apr 1953

0.0.400.112/1205 APG

DEVELOPMENT: ORDTS
PROJECT MO.: TS2-2015

RELATED FIRING RECORDS: 1453 - 1481

MATERIKL

U. S. Rifle, Cal. .30, Ml, Winchester No. 1225565
U. S. Rifle, Cal. .30, Ml, Springfield Armory No. 3470273

Cil Lubricating Preservative, Sp(PL-SP)
Specification MIL-L-644A W/Amend. 1
Stk No. 14-0-2833-994
Cont. DA-28-024-ORD-1990(52)
American Oil & Supply Company
Nawark, New Jersey

Oil Lubricating
Preservative for 20MM M-3 Aircraft Machine Gun
NRL E-51
BuORD Stock No. 1941-0-50
Contract No. NORD 12123
Lehigh Chemical Products Company
Chestertown, Maryland

MOITINUMMA

Cartridge, ball, caliber .30, M2, Lot No. F.A. 4046 Cartridge, ball, caliber .30, M2, Lot No. TWL 40818

FACILITIES

No special facilities were required.

ROUND-BY-ROUND DATA

DATE	•	TIME	ROUNDS	REMAN	<u>is</u>		د			
			.30, M1, FA-4046	Springfield	Armor	No.	3470273	Lubricates	with MIL-L-	5441
Aug.	17 18 19	1430 1330 1000	20 20 20	Rapid	fire -	- Sat	isfactory isfactory isfactory		•	

DATE		TIME	ROUNDS	notates.
Aug.	20 21 22 23 24	1050 0958 1030 1052 1035	20 20 20 20 20 1-13	Rapid fire - Satisfactory Rapid fire - Satisfactory Rapid fire - Satisfactory Rapid fire - Satisfactory Parid fire - Satisfactory Uth rd. fxile: to feed. Bolt did not return far mouth to rear.
•	25	1012	11 ₁ -20 1-4	Rapid fire - Satisfactory Large amount of sand had accumulated on wapon oversight. 5th rd. failed to feed. Bolt does not return all the way to reare
			5-12 13	Failed to eject clip after 12th round. 14th rd. failed to feed because of short bolt action.
			14-15	16th rd. failed to feed because of short bolt actime. 17th rd. failed to feed because of short
			16	bolt actions löth rd. failed to feed because of short
4		•	17	holt action.
			18-20	Failed to eject clip after firing 20th rd. Gas cylinder lock screw was slightly loose and was tightened.
	26	1425	1-9	10th rla wiled to feed because bolt did not return for enough to the rear.
			10-11	12th rd. failed to feed because bolt did not return far enough to the rear.
			12-13	13th rd. filled to eject. Operating rod was off bolt.
			11,-20	Rapid fire - Satisfactory. Weapon has less binding and is easier to operate than other HL. Has also collected more sand than other ML.
	27	1055	1-13 14-20	Ilith rd. Failed to feed. Rapid fire - Satisfactory Weapon operates much easier than other ML.

U. S. Rirle, Cal. .30, 11, Springfield ir 16. 3470273 Lubricated with H.L. E-51 Ammunition - Lot No. 1A-4046

Aug. 26	1545	9	2nd, 4th, 7th, and 9th ro nds failed to fire. Returned file for reassembly and replaced
	1615		firing in with a new one. Rapid firs - Satisfactory

FIRING RECORD NO. 1179 SHEET 3 OF 7

DATE	TREE	ROTNUS	RIMARKS
Aug. 29 30	1510	20 20	Rapid fire - Satisfactory Rapid fire - Satisfactory Out side housing of weapon is beginning to get dry.
31. Sep. 1	1330 1500	20 1-4	Rapid fire - Satisfactory Weapon is drying factor than other M. Bolt is harder to operate and hangs up similiar to the other weapon with this oil.
	Lot	t no ThI-40818	
2	1548	5-20 1-10	Rapid fire - Satisfactory Outside of weapon is dry but the working parts still have oil. Bolt is also hard to operate when trigger has been pulled. 11th round failed to feed. Round did n.t come up high enough to enter chamber.
		11-16	Rapid fire - Satisfactory Clip failed to eject because the bolt did not return far enough to the rear. Satisfactory
3	1437	1 2 - 17	Bolt is still hard to open. 2nd round did not feed because of bolt not returning far enough to rear. Did eject round that fired. 18th round failed for the same reason.
		18 19	19th round failed for the same reason. 20th round failed for the same reason. Cannot open bolt by hand.
h	1535	20	Satisfactory. Eolt was hard to open before firing. 2nd round failed to feed because bolt did not return far enough.
		2-l ₁ 5-6 7 8-9 10	5th round failed to feed for same reason. 7th round failed to feed for same reason. 8th round failed to feed for same reason. 10th round failed to feed for same reason. 11th round failed to feed for same reason. 12th round failed to feed for same reason.
Sep. 5	11453	12-17 18 19-20 1	18th round failed to feed for same reason. 19th round failed to feed for same reason. Satisfactory Could not get bolt open without using force before firing in order to remove round left in chamber. 2nd round failed to feed because bolt did not return to rear far enough.

FIRING BICORD NO. 1479 SHEET 4 OF 7

		•	•
DATE	TIME	ROUNDS	REMARKS
	31 53	•	3rd failed to feed for same reason.
Sep. 5	1453	2	Fired Satisfactory but failed to eject clip.
•	:	3-8 9	10th round failed to feed for same reason as
		y	No. 2.
		10	11th round failed to feed for same reason as
	• (2)	10	No. 2.
•		13	12th round failed to feed for same reason as
		n ,	No. 2.
		12	13th round failed to feed for same reason as
٠.		12	No. 2.
• .	•	13	lith round failed to feed for same reason as
		2	No. 2.
		14	15th round failed to feed for same reason as
		744	No. 2.
		15	16th round failed to feed for same reason as
	•	/	No. 2.
		16	Clip failed to eject.
		17	18th round failed to feed as bolt stuck
		+1	1 1/Air from elambor.
		18	19th round failed to feed. Reason in No. 2:
•		19	20th round failed to feed. Reason in No. 2
		20	Could not open bolt by hand.
Sep. 6	1500	i	2nd round failed to feed because bolt did
Sope o	. 200	-	not return far enough to rear,
	. 10	· 2	3rd round failed to feed. Same reason as No. 2.
•	(i)		4th round failed to feed. Same reason as No. 2.
		<u> </u>	5th round failed to feed. Same reason as No. 2.
		3 6 7 8	6th round failed to feed. Same reason as No. 2.
		6	7th round failed to feed. Same reason as No. 2.
		7	8th round failed to feed. Same reason as No. 2.
		Š	9th round failed to feed. Same reason as No. 2.
		9	10th round failed to feed. Same reason as No. 2.
		10	11th round failed to feed. Same reason as No. 2.
		11	12th round failed to feed. Same reason as No. 2.
		12	Failed to eject clip.
		13	lith round failed to feed. Same reason as No. 2.
		13 14 15 16	15th round failed to feed. Same reason as No. 2.
		15	16th round failed to feed. Same reason as No. 2.
			17th round failed to feed. Same reason as No. 2.
-		17	18th round failed to feed. Same reason as No. 2.
	. •	18	19th round falled to food. Sens reason as No. 2.
ŕ		19	20th round failed to feed. CSuns reason as Ho. 2.
		20	Failed to eject clip.
			•

DATE	TIME	ROURIDS	RIMARKS
<u></u>			Had to force bolt open in order to remove
Sep. 7	1507	1	and in complete Solt does not go and and
-			amen into hattory nositions and lower to
			to food because and bolt does not retain
			Alle distance to rear position when it was
		2	and mound failed to feed. Same reads as not to
		2 3 4-5	1.+h nound failed to feed. Same reason as how 20
		ภ์-ร	5th round failed to eject. Of stopped as
		4 /	-id maint negition.
		6	7th round failed to feed. Same reason as No. 2.
		6 7 8 9	8th ro nd falled to feed. Same reason as No. 2.
		8	Folt stayed wack and clip failed to eject.
		9	9th round failed to eject. 11th round failed to feed. Same reason as No. 2.
		10	ilth round railed to reeds but some
		11	11th round failed to eject. 12th round failed to eject.
		12	13th round failed to eject.
		13 14	lith round failed to eject.
		74	15t. round failed to elect.
		15 16	16th round failed to eject. Bolt does not
		10	leave chamber. Clip did not eject.
		17	17th round failed to eject.
		18	18th round failed to eject.
		17	19th round failed to eject.
		20	20th round failed to eject.

U. S. Mile, Cal. .30, 11, Winchester No. 1225565 Lubricated with MML E-51 Amounition - Lot No. FA-4046

Amount of	II - Doo	100 111 4-4-	
Aug. 17	1610	20	Rapid fire - Satisfactory Rapid fire - Satisfactory. Oil evaporates faster than M King WIL-L-Ohha oil.
13	1335	20	
19	1005	20	Rapid fire - Satisfactory Rapid fire - Satisfactory. Oil is collecting dust around chamber
2 0	1055	20	
21	0956	20	Rapid fire - Satisfactory. Lolt squaks and is dry.
22	1035	20	
23	1050	50	Rapid fire - Satisfactory. Almost impossible to open bolt by hand in order to remove round in chamber before firing.
21;	1033	1	Fired round in chamber to open bolt. Gould not open it with hands.

FILING RECORD NO. 1479 SHEET 6 OF 7

DATE	TIME	ROUND	REMEAS
Ol.	1033	2	Bolt still fails to open with use of hands.
Aug. 24	10))	3	Bolt still fails to open with use of hands.
		Ĭ4	Bolt still fails to open with use of hands.
		3-20	Rapid fire - Satisfactory
25	1010	20	Rapid fire - Satisfactory
2 6	1420	1-12	Rapid fire - Satisfactory. Fired chambored
20	7717.0		round to open bolt first. Clip was not
			ejected.
		13	lith round failed to seed as bolt did not
			return all the way to rear.
		14-17	18th round failed to feed as bolt did not
			return all the way to rear.
		18-20	Rapid Tire - Satisfactory.
27	1045	1	Bolt failed to return to rear after firing
-•			first round.
		2-8	Rapid fire - Satisfactory. 9th round failed
			to feed. Bolt did not leave forwar, position,
	•		and is unusually hard to open.
		9-12	13th round failed to feed. Same reason a (2).
		13-16	Rapid fire - Satisfactory. Clip failed to eject.
		17	18th round failed to feed.
		18-20	Rapid fire - Satisfactory.
U. S. Rif	le, Cal.	.30, 111, Winch	ester Ec. 1225565 Lubricated with ML -L-644A
Aug. 28	1545	20	Rapid fire - Satisfactory
29	1510	20	Rapid fire - Satisfactory
30	11110	20	Rapid fire - Satisfactory. Weapon is still
,,,			damp with oil.
31	1130	2 0	Rapid Fire - Satisfactory
Sep. 1	1500	20	Rapid fire - Satisfactory
	(1	ot No, INL-408	
2	1552	20	Rapid fire - Satisfactory
2 3 4 5 6	11415	20	Rapid Fire - Satisfactory
14	1515	20	Rapid Fire - Satisfactory
5	1503	20	Rapid fire - Satisfactory
6	1508	20	Rapid fire - Satisfactory
7	1515	1-12	Rapid fire - Satisfactory. Clip failed to eject.
		13-20	Hapid fire - Satisfactory.

FIRING RECORD NO. 1479 SHEET 7 OF 7

SUMMARY

WEAPON NO.	LUBRICANT	NO. STOPPAGES
34702 73	MIL-L-644A	10
34702 73	NRL E-51	62
1225565	NRL E-51-	6
1225565	MIL-L-644A	0

*Does not include failures to eject clip or those encountered on the first day of firing a cycle.

LUBRICANT	NO. STOPPAGES
MIL-L-644A	10
NRL E-51	68

OBSERVATIONS

It was observed that the Rifle, M. is very sensitive to the lubricant under desert conditions as is shown by the summary above.

When the Rifles were disassembled after completing the first cycle it was observed that the one with the NRL E-51 lubricant was completely dry but contained less cand than the one with the MIL-L-644A lubricant. An attempt was made to show this in photograph number A91949.

It was also observed that the NRL E-51 lubricant allowed more wear on the working parts.

It was also observed that the overall working quality of the weapon lubricated with the MIL-L-644A oil was far superior to that lubricated with the NRL E-51 oil.

OBSERVERS

None

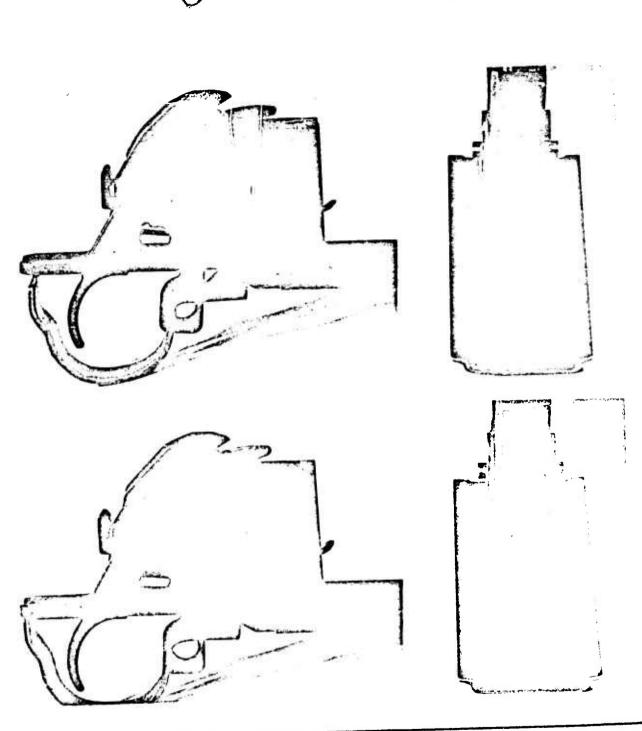
C. R. STRATTON Lt. Col., Ord Corps Commanding Curell - & Robinson

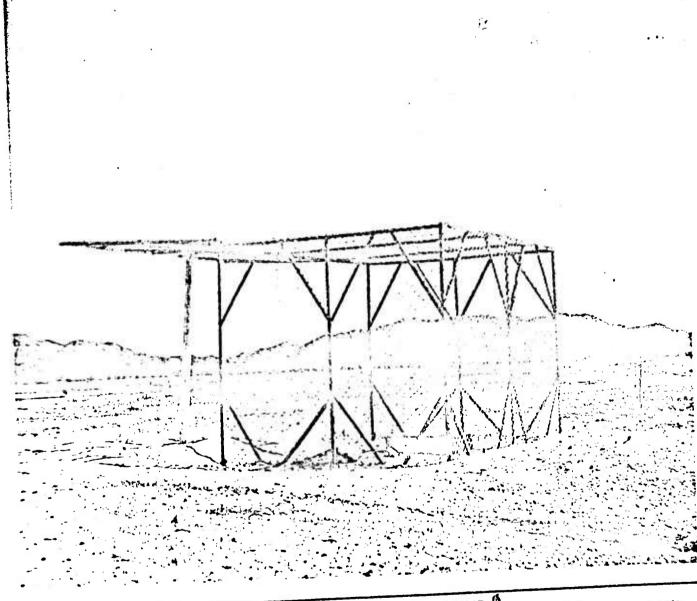
CARROLL G. ROBIESON
Project Engineer
Southwest Research Institute

Inclosure: Photograph No. A91949

APPENDIX C

APG Photographs Number A91949 and A91973





D

A91973

ABERDEEN PROVING GROUND

17 Sept. 1953

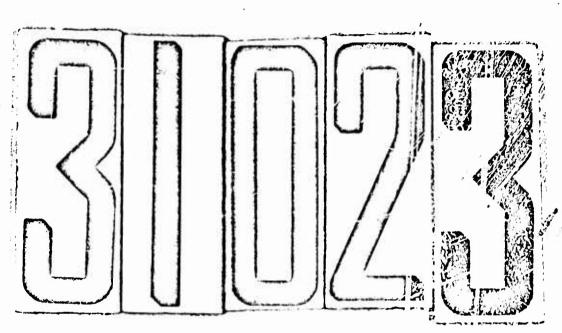
9301 TSU (ORD) CLILATIC TEST DETACHLENT, YTS, YUMA, ARIZONA

Project No. TS2-2023. Desert Tests 1953. Test of Experimental Lubri
ents. Enclosed cage used for exposed storage of weapons during test.

Armed Services Technical Information Agency

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