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RESEARCH DIVISION

CONDENSED MONTHLY SUMMARY REPORT

SEPTEMBER, 1942

PERSONNEL

Effective September 19, W. E. Brun was transferred to the Commercial Division as Special Assistant to A. E. Buchanan, Jr., Commercial Division Production Manager. Effective the same date, P. H. Burdett was appointed Section Head, Primer Section, vice W. E. Brun.

T. B. Johnson, B.S. '36 University of South Carolina, reported for duty as Research Chemist on September 10.

L. R. Feinauer, B.S. '42 University of Utah, reported for duty as Research Chemical Engineer at the Utah Ordnance Plant on September 21.

PRIMERS

Non-Mercuric, Non-Corrosive Primers:

A Part II of the project has been approved.

Substitutes for part of the polnol in the 1348-type priming mixture are being evaluated in the hopes of reducing the tendency of mass detonation.

Evaluation of New Priming Explosives:

Work on an aluminum powder as a fuel continues. Results look promising but no primers have as yet been charged.

Basic information on the relative igniting power of all common priming mixtures in .30/06 cartridges is being developed.

Determination of Moisture Content of Priming Explosives:

The Karl Fischer method of moisture determination is being tried. An effort is being made to overcome difficulties in this method resulting from the presence of potassium chlorate and lead sulfocyanate.

Tests are in progress on determination of moisture in mercury fulminate, polnol and 299-T mixture.

Plant Assistance (Bridgeport):

At the request of management additional work has been done on the development of a suitable packing method for 20 M/M primers. A method has been developed which is substantially free from mass detonation and permits placing 5000 primers in a case.

Work is continuing to develop a practical process for the disposal of scrap PETN. This work is being expanded to include the disposal of other scrap chemicals from the Hazardous Area.

Additional lots of aminoguanidine bicarbonate have been evaluated for plant use. A report of the work done on the factors affecting the yield of tetrazene has been written.

The possibility of incorporating wet PETN in 125 mixture has been studied. The time required to sieve the premix containing wet PETN through even the coarsest sieve has been found to be excessive for the present Bridgeport method of operation.

Information has been collected to make possible the conversion of antimony sulphide granulation determination from hand sieving to Ro-Tap sieving.

An investigation into the cause of muzzle bursts in .30 caliber tracer production has indicated that the crimping and sizing operation is a contributing factor.

The effect of variations in the moisture content of TX-2 priming mixture has been evaluated. There is a tendency for high bridge thicknesses with mixtures containing increased amounts of moisture.

The effect of variables in charging on the bridge thickness:pellet weight relationship of #43 TX-2 primers is being studied.

Data are being collected to make possible the writing of a specification for primer foiling paper.

The effect of aging time of 1348 mixtures between mixing and charging has been observed.

It has been found that large variations in the granulation of antimony sulphide and small variations in granulation of potassium chlorate has no appreciable effect upon the sensitivity of the resulting #39 TX-2 primers.

Safety: The following items have been brought to the attention of and adopted by the Bridgeport Plant:

(1) Changing the order of addition of ingredients to the jelly bag in dry mixing;

(2) Modifying the jelly bag holder to decrease the height of fall for fulminate;

(3) Designating a separate walkway for powder carriers from Rim Fire Mixing Area to Tracer Charging Building.

Plant Assistance (Military Division):

Activity continues on the preparation of process records pertaining to priming mixtures and explosives operations.

Lake City: The factors affecting the control of charge weight of caliber .30 primers have been studied.

The cause of the failure of caliber .50 primers to pass the low drop test has been evaluated.

Assistance has been given in the control of quality of caliber .50 incendiary ammunition.

Denver: Further assistance has been given in the preparation of process records.

Problems pertaining to the improvement in quality of caliber .30 incendiary ammunition have been pursued.

Utah: The cause of low pellet weights in caliber .50 primers has been under investigation.

The causes of caliber .50 tracer muzzle bursts have been studied.

Further work has been done on the incorporation of wet PETN in priming mixtures.

STEEL AMMUNITION

.22 Rim Fire Cases:

Low Velocity: A promising corrosion-inhibiting procedure has been worked out for the Government contract.

High Velocity: Further work has been done to increase the amount of work-hardening done by the second draw punch in the hopes of increasing extractability.

Caliber .45 Steel Case:

A tubular heat-treating furnace for .45 cases had been designed and built on a laboratory scale. Its success prompted the building of a pilot production model which is now being used by the Manufacturing Department. A memorandum report on this has been prepared. A final Progress Report on the research activity in the caliber .45 steel case development is being prepared.

Caliber .50 Steel Case:

A detailed investigation into the variables affecting the cup was made. The problem was complicated by the fact that the American Can Company, which will supply all the cups, plans to use single-action presses. Double-action presses permit a coining hold-down by the blanking punch which simplifies the situation considerably. Several promising cups are being evaluated by fairly extensive runs.

A new draw layout, featuring four draws and eight dies, was carefully worked out and is being evaluated by farily extensive runs.

More than 1000 cases have been fired. Casualties still do not loom large nor appear difficultly eradicable. Extraction force has been brought down from over 1200 pounds to 300-400 for cold-worked cases, and to zero for heat-treated cases. Brass cases average slightly over 100 pounds.

Building 341-B was selected, cleaned out and more than half the equipment has been placed on the floor. It is hoped to be using much of the pilot equipment during October.

Steel Primer Cups:

Humidified storage tests indicate that both steel and brass primers deteriorate at the same rate with the relative sensitivity of steel and brass remaining the same.

FILLER WADS

Molded Wads:

A Progress Report was circulated.

A project to evaluate a 100% Asplund formulation has been submitted.

Ammunition Products Committee approval to use Asplund-kraft wads was secured.

Piston Plus:

A careful test which unquestionably separated the three sources of dephlegmatizing material (Piston Wad, body, basewad) showed definitely that the favored Piston Wad impregnant, Armour No. 1, did not affect the powder.

INTERIOR AND EXTERIOR BALLISTICS

Small Arms Powders:

The ignition study of .22 caliber powders is nearly completed. The bomb test and the primer calorimeter test appear to be in satisfactory agreement.

.50 Caliber Bullet Accuracy:

A gauge has been devised for measuring the position of the core. Bullets have been separated by this gauge and targets from these bullets are being analyzed.

ARMS

Model 760:

Redesign of the fire control to shorten the trigger pull and reduce costs of the component parts is nearing completion. Several 5-shot groups were fired at 100 yards with very good results. A report from the Ilion Development and Design Section following their study of the model is still awaited.

Model 800:

A Part II for this project is about to be circulated.

Bore and Sight Aligner:

Plant tests of this equipment are giving results closely approximating those previously obtained by Research personnel and indicate that it should be adopted as standard at an early date. A procedure which includes the use of this equipment, prior to the firing of three shots at a target, will give a better check on accuracy than is possible with a firing test alone, will show a saving in ammunition and probably a saving in labor.

Model 600 Series:

Some accuracy shooting of M/610 and M/611 rifles has been done as time permitted in an attempt to isolate the factors accounting for poorer accuracy in these models as compared with certain other arms chambered for this cartridge. There is some question whether accuracy can be improved without increasing production costs for the rifles.

Walnut Blanks:

A large number of inquiries and discussions has resulted in the receipt of a considerable number of laminated stock samples. Coming from several sources these include walnut, yellow birch, maple and beech.

Preparations were made for a run on a drastic drying schedule by starting with green Springfield blanks and urea-coating them at the sawmill promptly after cutting from the logs.

Pattern Control:

Omni Choke: Further tests of the new variable choke principle, tentatively termed Pneumatic Choke, confirmed its early promise.

Trombone Choke: Trouble with the binding of the trombone slide has not yet been entirely overcome but encouraging results have been obtained.

Variable Angle Choke: Several chokes with constriction angles very markedly sharper than the standard Remington angle of $0^{\circ}51'33''$ have been made and patterned. Several surprising results have been noted.

Electrically Strain Sensitive Gauges:

The use of this principle in a pressure gauge similar to a quartz pressure gauge is being investigated.

CHEMICAL AND METALLURGICAL (ILION)

Plant Assistance:

Miscellaneous assistance has been given to the tool hardening room, and cyanide treating of various tools has continued. Experimental cementing of high speed steel inserts to medium carbon steel shanks has given encouraging results, and one type of turning tool so made has been accepted by the plant. Salt bath descaling has continued with satisfactory results.

Hard Chromium Plating:

The second plating tank has been installed and as a result plating capacity has been tripled. Plating of tools and gauges is being carried out 24 hours a day and is progressing satisfactorily.

Low Cost Deburring:

Rumbling techniques applied to several Springfield components indicate that this method may satisfactorily supplant finish filing. Work on wheel and electrolytic methods has been held up pending the receipt of necessary equipment and chemicals.

Application of Browning Solution:

Various materials have been tried as a substitute for natural sponges. Of these, cellulose sponges and felt appear to be promising, and are being used by production for large scale tests.

MISCELLANEOUS

Cathode Ray Oscillographs:

The first of the new units is completed except for minor circuit troubles. It is expected that this will be ready for use shortly.

Rite-Flite Traps:

Some of the castings for these traps have been received and a model is now being built. Receipt of the remaining castings is expected at an early date.

PROJECTS WRITTEN THIS MONTH:

Metallurgical Plant Assistance-Ilion (Part III)
Development of a 100% Asplund Molded Wad
Mechanism of Primer Ignition (Part I - Literature Survey)
Evaluation of Higher Velocity Rifle and Ammunition

PROJECTS BEING WRITTEN OR PROPOSED:

Testing of Materials for Use as Bullet Lubricant
Design for Lower Cost Autoloading Center Fire Rifle (M/740)
Design for Low Cost Bolt Action Rifle (M/721)

PROGRESS REPORTS WRITTEN:

Metallurgical Plant Assistance - Ilion
RDR-42-17

Shot Shell Filler Wadding
RDR-42-15

Caliber .50 Steel Cases
RDR-42-16; RDR-42-16A

LIBRARY ACCESSIONS:

Industrial Chemistry of Colloidal and Amorphous Materials - Brougton
Textbook of Organic Chemistry - Richter
Textbook of Organic Chemistry - Wertheim
How to Conduct Conferences - Cooper
Organic Reactions (Vol. I)
How to Supervise People - Cooper
Statistical Methods - Snedecor
Industrial Chemistry - Riegel
Poison's Exponential Binomial Limit - Molina
Chemical Technology of Petroleum - Gouse and Stevens
Organic Chemistry - Whitmore

WOS:MDB
10/13/42

SUMMARY REPORT OF RESEARCH PROJECTS

$500 AND OVER

	Number Of Projects	Amount Authorized*
New projects authorized during September 1942.....	2	$ 14,000
New parts of old projects authorized during September 1942.....	2	7,750
Completed during September 1942.....	5	13,700
Completed to date.....	66	259,646
Open (September 30, 1942).....	62	574,413
Completed parts of open projects.....	-	197,848

*Not including Plant Increase and associated Operations items.

EXPLANATION OF THE TERMS USED ON SCHEDULE

"Urgency"

D	- Dormant
N	- Normal activity
A	- Urgent
AA	- Highest practical urgency

"Section"

C & M	- Chemical and Metallurgical

"Amount Authorized" - Refers to last part

"Balance" - Refers to end of previous month

"% Spent" - Refers to end of previous month and is for last part

"Completion Dates" - Refers to scheduled and revised completion dates

"% Complete" - Estimated in terms of work under current part

SCHEDULE OF RESEARCH PROJECTS

TITLE & CATEGORY	P.O. NUMBER	NUMBER	URGENCY	SECTION	ACTIVE PART	DATE AUTH.	AMOUNT AUTH.	BALANCE AUGUST	% SPENT	COMPLETION DATES				JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
														PERCENT COMPLETE											
AMMUNITION . SHOT SHELLS																									
MOLDED FELT WADS	[illegible]	B 10	N	C&N DPT	10	3/40	8 800	3 746	69	1/41	12/41	6/42	12/42							88	90	90			
STEEL SHOT SHELL HEADS	F 126 R	B 64	N	C&N DPT	6	8/42	4 600	4 736	0											15	15	15			
NEW REMINGTON PETERS CRIMP	J 3043	B 100	N	C&N DPT	10	9/41	3 600	173	94	4/42	9/42									90	90	90			
ALL METAL SHOT SHELLS	F 338 R	B 70	D	C&N DPT	3	7/41	7 500	5 740	23	7/42	1/43									30	30	30			
STEEL PRIMER CUPS	J 3069	MCB 1013	N	PHYSICS	1	9/40	1 975	154	93	6/41	3/42	9/42								85	90	92			
PISTON PLUG WADDING	L 3091	B 329	N	C&N DPT	1	3/42	5 200	3 089	47	12/42										40	45	45			
SMOKELESS POWDER SHOT SHELL BLANKS	L 3100	MCB 3856	N	PHYSICS	1	4/42	500	279	44	6/42	9/42									90	90	90			
AMMUNITION .C.F.&R.F																									
STEEL RIM FIRE	F 130 R	B 63	A	C&N DPT	6	3/41	13 800	8 433	46	1/42	5/42	9/42								60	60	60			
BULLET LUBRICANTS	H 1021	B 90	N	C&N DPT	8	9/39	6 700	166	98	8/41	6/42	10/42								95	95	95			
DEVELOPMENT OF NON MERCURIC PRIMING	E 3023	B 213 R	A	PRIMER	8	9/41	7 000	6628	5	6/42												5			
ALUMINUM C.F. CASES	E 3034	MCB 1070	D	C&N DPT	1	1/41	1 800	1369	9	6/41	6/42	INDEF								0	0	5			
STUDY OF BULLET TRAJECTORIES	E 3036	B 136	D	PHYSICS	3	11/41	5 000	2677	47	10/42										20	30	35			
STUDY OF LEAD BULLET LUBRICATION	E 3030	B 237	N	C&N & PHYSICS	1	3/42	7 500	1075	85	9/42	3/43									30	30	30			
ALUMINUM R.F. CASES	E 3034	B 137	D	C&N DPT	1	6/41	3 850	1760	54	10/41	12/42	6/42	9/42							30	30	30			
COLORING BULLETS	E 3062	MCB 1839	D	C&N DPT	1	6/41	1 000	958	4	12/41	3/42	5/42								0	0	0			
ACCURACY OF HARD LEAD BULLETS	E 3065	B 306	D	PHYSICS	1	7/41	3 000	1790	40	7/42	3/42									30	30	30			
PLANT ASSISTANCE ON .22 R.F.	L 3060	B 330	N	PRIMER	1	3/42	3 400	1844	38	9 42	9/42									40	45	60			
DEVELOPMENT INCENDIARY AMMU.	L 3090	B 366	A	PRIMER	1	4/42	13000	9510	25	10/42										25	35	40			
.50 CALIBER STEEL CASE	89 /	B 416	AA	C&N DPT	2	6/42	36000	10796	69	9/42										15	30	35			
.50 CALIBER ACCURACY	L 3112	MCB 2764	A	PHYSICS	1	7/42	984	692	30	9/42										5	16	90			
STORAGE TESTS OF .22 MATCH AMMU.	L 3118	MCB 2765	N	C&N DPT	1	8/42	600	738	2	6/43												10			
.30 CALIBER CARTRIDGE DEVELOPMENT	L 3126	MCB 2768	N	PHYSICS	1	8/42	1800	1800	0	7/43												5			
AMMUNITION _ GENERAL																									
LEAD BASE ALLOYS	F 849 R	B 96	D	C&N DPT	1	10/37	4 980	800	88	12/39	1/43									75	75	75			
STEEL DRAWING	G 289 R	B 106	D	C&N DPT	1	6/38	4300	3 179	37	NONE	12/42									10	10	10			
COLORING METHODS FOR STEEL AMMU.	J 3048	B 190	N	C&N DPT	3	7/41	3000	2016	33	10/41	6/42	9/42								90	90	90			
RAW MATERIALS SPECIFICATIONS	H 1031	B 136	D	C&N DPT	1	3/39	11 000	(77)	101	3/40	1/43									95	95	95			
NEW PRIMING MATERIALS	H 1040	B 170	D	PRIMER	2	3/40	9200	1237	87	5/41	1/42	6/42	10/42							80	90	90			
EVALUATION OF NEW PRIMING EXPLOSIVES	E 3032	B 210	N	PRIMER	1	1/41	5500	3391	37	12/42										15	35	60			
SMALL ARMS POWDERS	E 3062	MCB 2146	N	PHYSICS	2	11/41	5 800	3 506	33	/43	6/43									25	40	50			
ASSISTANCE TO PLANT ON EXPLOSIVES	L 3078	B 340	A	PRIMER	1	3/42	25 000	3 287	87	9/42										90	90	100			
IMPROVEMENT IN TOOL MFG.	L 3082	B 344	N	C&N DPT	1	3/42	4000	3 396	19	6/43										5	5	5			
COMPETITIVE PRODUCTS	L 3098	B 387	N	C&N DPT	1	4/42	3000	2 271	25	4/43										10	10	10			
MOISTURE OF PRIMING EXPLOSIVES	L 3138	B 416	N	PRIMER	1	8/42	2900	2 634	9	3/43											0	30			
ARMS																									
DESIGN FOR LOW COST C.F. ARMS	E 1000	B 130	A	DESIGN	4	5/42	12 000	11 480	9	7/41	INDEF	10/42								5	5	5			
NEW ALLOYS FOR GUNS	H 1001	B 140	D	C&N ILION	4	7/40	33 650	15 196	55	9/40	9/42	1/43								60	60	50			
MODEL 600	J 3034	RI 96	N	DESIGN	7	6/40	8000	4 087	53	6/40	6/42	1/43								60	50	50			
CHOKE PATTERN RELATIONSHIP	J 3039	B 171	N	C&N DPT	1	3/40	9100	366	96	1/41	1/42	9/42								60	85	88			
IMPACT TESTING	J 3056	B 209	D	C&N DPT	3	12/40	3 340	253	95	5/41	11/41	4/42	1/43							65	65	65			
WALNUT BLANK	E 3042	B 280	N	C&N DPT & ILION	3	9/41	4 700	2 306	40	5/42										60	50	55			
M 600 STOCK AND FORE END	E 3054	B 285	N	C&N DPT	1	6/41	5 200	4 661	10	6/42	9/42									10	10	10			
SINGLE BARREL SHOT GUN	E 3058	B 273	N	DESIGN	1	7/41	6 800	730	90	3/42	4/42	6/42	8/42							90	90	90			
LOW COST FINISHING METHODS	E 3064	MCB 2150	D	C&N ILION	1	8/41	3 000	3 000	0	11/42	8/43									0	0	0			
LOW COST .22 RIFLE M 600	E 3067	B 286	N	DESIGN	1	9/41	5 000	3 440	44	3/42	4/43									40	40	40			
LOW COST BREECHING	E 3066	B 289	N	C&N ILION	1	9/41	6 300	3 781	13	7/42	6/43	1/43								5	5	35			
HARD CR. PLATING AT ILION	L 3078	MCB 2300	A	C&N ILION	1	1/42	1 400	701	53	6/42	9/42									20	70	60			
METALLURGICAL PLANT ASSISTANCE	L 3080	MCB 2302	A	C&N ILION	2	3/42	6 000	1 667	73	9/42										50	60	90			
BORE AND SIGHT ALIGNER	L 3097	MCB 2666	A	PHYSICS	3	9/42	750	577	64	9/42											95	95			
RECOIL REDUCING ROTARY CHOKE	E 3060	B 390	N	C&N DPT	2	4/42	7 250	5 307	27	12/42										5	5	10			
CONSTRUCTION CHOKE BORING	E 3062	B 399	D	C&N DPT	2	5/42	5 500	3 720	[illegible]	4/43										0	0	0			
RECOIL REDUCING LONGITUDINAL CHOKE	L 3110	B 397	N	C&N DPT	1	5/42	5 000	5 145	3	12/43										0	5	10			
APPLICATION OF BROWNING SOLUTION	L 3126	MCB 2764	N	C&N ILION	1	8/42	2 000	1 885	6	2/43											0	10			
FORCE MEASUREMENTS ON SPRINGFIELD RIFLES	L 3131	B 419	N	PHYSICS	1	9/42	4 000	4 000	0	1/43										0	0	0			
S.L. DEVICE	L 3137	B 417 R	AA	DESIGN	1	8/42	4000	4 000	0	11/43															
TARGETS																									
ELIMINATION OF CRACKS IN LIMESTONE TARGETS	L 3090	MCB 2801	N	C&N DPT	1	3/42	1000	330	70	6/42	9/42									90	90	90			
TRAPS																									
LOWER COST TRAP	E 3030	B 369	N	DESIGN	3	5/42	1200	370	63	11/41	3/42	8/42								80	90	90			
MISCELLANEOUS																									
ELECTRICAL CHRONOSCOPE	G 133 R	B 126	D	PHYSICS	2	11/39	4 600	941	81	7/39	1/42	9/42								60	80	90			
TWO C.R. OSCILLOGRAPHS	E 3021	B 211	A	PHYSICS	1	12/40	2 500	648	87	3/41	11/41	9/42								50	85	70			
EBG GAUGES	J 3036	B 212	N	PHYSICS	8	1/41	3 000	1666	18	12/41	6/42	9/42								5	15	20			
LONG RANGE PLAN	E 3075	MCB 2243	N	C&N DPT	1	11/41	180	436	49	1/42	2/42	6/42	9/42							60	60	60			
MAGNETIC TESTERS FOR ILION	L 3116	MCB 2750	AA	PHYSICS	1	8/42	730	375	39	8/42	9/42									5	75	95			
PLANT ORDERS UNDER $500																									
POWDER LEVEL INDICATOR FOR 50 CAL. MACH.	E 3077		N	PHYSICS	1	1/42	300	116	49	6/42	7/..	11/42								60	90	90			
MANUAL OF STATISTICAL METHODS	L 3114		N	PHYSICS	1	7/42	600	400	31	10/42										5	15	30			
BORE SIGHT ALIGNER FOR C.M.	L 3130	MCB 2767	AA	DESIGN	1	9/42	350	350	0	10/42												95			