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ANNUAL REPORTS

1933-1934 Annual Report

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SUBJECT: Annual Report 1933-34

Supply

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[illegible]	26 6 34				
SC. [illegible]	27.6.34				
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R	28/6.				

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Vt. P164—1165 600 5/33 P. St. (E. 4234)

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SUBJECT: Annual Report

Supply 1933-34

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D.O.F.,

2 copies forwarded

Herewith Annual Report on the Royal Gunpowder Factory for the year 1933-34.

H.A. Phillips
for Superintendent,
R.G.P.Factory.

25.6.34.

R. G. P. F. ANNUAL REPORT

for the

YEAR 1933 - 34.

STAFF. Mr. Scott, the Managing Chemist, retired in November and his place was filled by the promotion of Mr.H.A.Phillips. The consequential vacancy of Grade I Chemist was filled by the appointment of Mr.A.H.Roberts from R.N.C.F., Holton Heath, as a result of a recommendation by a Selection Board presided over by a Civil Service Commissioner.

Mr.S.F.Hines, Grade II Chemist, was transferred to War Office in January 1934, and Mr.E.C.H.Lawrence was appointed Junior Assistant Chemist in March 1934. The Grade II vacancy has not yet been filled.

The fact that a Grade I Chemist had to be obtained from outside the R.G.P.F. staff, and also that the appointee did not have the specialized experience which is desirable for a man holding such a post, indicated such a serious state of affairs that the matter has been specially reported to you with a recommendation for an immediate increase of two Grade II Chemists to ensure adequate succession.

MAINTENANCE. As foreshadowed in last year's report the condition of the plant and buildings, more especially those installed during the war, has been the subject of special review. This has resulted in the drawing up of a programme of work covering the years 1933-34, 1934-35, and 1935-36 submitted to you already in a special report, for the completion of which it is calculated that some £45,000 extra to what has been hitherto taken as a normal expenditure on maintenance work, will be required. A certain proportion of this programme was carried out during the year under review as will be observed from the figures under the maintenance headings in Schedule (C).

As a result of the consideration given to this matter two large and important building schemes have been formulated for carrying out during the next five years; the first being a £40,000 scheme to cover the cost of replacing the existing Guncotton Stoves with a modern installation of Quinan Driers, and the second is the replacement of cast iron stills for the recovery of waste acid by a modern tower process at a cost of some £10,000. The first scheme is primarily

designed to ensure safety, while the second is expected to produce economical results of an appreciable nature, especially under emergency conditions.

The scheme for the better provision of steam and electricity required for emergency purposes in the Guncotton Section, referred to in last year's report, is being implemented during the current year by the installation of rotary converters with a connection to the outside power supply.

Where practicable reserve facilities are being used for current manufacturing purposes with the object of keeping the plant prepared for emergency requirements.

The drought of last year, which appears to be continuing this year, is having a serious effect on the internal transport of the factory which is largely water borne, and the use of a greater proportion of labour in the handling of materials has become necessary. The most serious aspect of this matter, however, centres round the transport of paste from the Nitroglycerine factory to the Cordite section as the Nitroglycerine buildings are isolated from one another and the rest of the factory by water, the only land connection being by small footbridges; plans for alternative methods of transport are being made.

PRODUCTION. The output programme for the year amounted to some 300 tons, an increase of some 50% on the previous annual outputs. The retarding of production in the later months of the year (referred to later on) caused total output to be some 40 tons less than the programme.

The improved Cordite suggested by R.G.P.F. and referred to in last year's report,(Cordite "W"), has given most satisfactory

results in practice, and under the latest instructions it will entirely replace M.D. for all Cannon Cordite. During the year ~~over~~ some 100 tons of "W" were ~~formed~~ made.

The manufacture of Picrite and R.D.N. Cordite was maintained at a development level only. It may be mentioned that a special milling machine of American origin for carrying out an essential process in Picrite manufacture has given so much trouble this year that home sources of supply of something more reliable are being sought.

A further development in Picrite manufacture is the substitution of a fusion process in an open vessel for the original autoclave process carried out at a pressure of some 150 lbs. per square inch. This is working satisfactorily. All the pressure processes have now been eliminated.

In general the position is clear for bulk expansion of Picrite output if and when required, subject always to the erection of a permanent installation.

The T.N.T. Pilot Plant erected during 1932-33 was put into operation. Experience showed that satisfactory results could only be obtained by continuous working. The best result was obtained in March when 18500 lbs. were produced at 1/6 s.d. per lb. This compares with a total production of some 75000 lbs. at a gross cost of some £9000.

The local problem of disposal of spent acid has received considerable attention but is not yet adequately solved.

Tetryl purification has been carried out throughout the year for the Army and Air Ministry.

A special plant has been installed in connection with the manufacture of Fuze Powder Mill Cake for issue to R.F.F. where it is finished.

The R.D. 202 Fuze Powder Plant has been used for a small amount of reblending and new manufacture.

For some time there has been a suggestion that the stability of M.D. Cordite produced at R.G.P.F. has not been up to the usual high standard, the reason for this is obscure but ~~it~~ is possibly

traceable to the use of linters instead of cotton waste for the manufacture of Guncotton during the ~~years~~ period 1928 ~~and~~ to 1932. The criticism culminated in M.G.O. deciding in March last that no more Cannon cordite should be made at R.G.P.F. until certain steps to ensure absolute cleanliness in certain of the manufacturing processes were taken. The cessation of Guncotton manufacture for some two months naturally upset the manufacturing programme somewhat badly, but the position is now clearing.

The question of using wood pulp or straw in place of cotton waste is at present being explored examined.

During the year a Calder-Fox Scrubber was installed in the Guncotton Section in place of a coke condenser for purifying the exhaust gases from sulphuric acid concentration. This scrubber is a more modern machine for this purpose and is expected to be more economical both in capital cost and maintenance than the older type of condenser. It has been installed in the first place more or less experimentally.

An experimental small scale denitration tower for recovering waste acid was erected and tried out with the object of obtaining information for the proposed large scale scheme already mentioned.

Glycerine Nitrator No.2 has been entirely rebuilt during the year.

PARTICULARS OF MANUFACTURE.

Guncotton Section.

Nitric Acid. Soda Nitrate charges	-	69 at 2 tons 36 at 1.1/2 tons 10 at 1 ton
Total Nitrate of Soda charged	-	226.24 S/tons crude 225.10 ,, pure
Equivalent HNO_3		166.84 ,,
Nitric Acid produced		182.20 ,, at 90.0% 164.05 ,, HNO_3
Loss		2.79 ,,
Efficiency		98.3%
Strong Sulphuric Acid used		217.14 S/tons at 94.5% 204.95 ,, H_2SO_4

Acid charged = 1372.25 S/tons containing	855.54	S/tons	H_2SO_4
	249.05	,,	HNO_3
	267.66	,,	H_2O
Strong Nitric Acid recovered	271.40	,,	at 89.69%
	243.40	,,	HNO_3
Loss	5.65	,,	
Efficiency	97.70%		
Weak Sulphuric Acid recovered	1070.29	S/tons	@ 78.95%
	845.49	,,	H_2SO_4
Loss	10.05	,,	
Efficiency	98.85%		

Concentration of Weak Sulphuric Acid.

Acid charged to concentrator	981.30	S/tons	at 78.52%
	770.53	,,	H_2SO_4
Strong sulphuric Acid produced	805.94	,,	at 93.95%
	757.22	,,	H_2SO_4
Loss	13.31	,,	
Efficiency	98.26%		

Nitration.

No. of Sets of Guncotton	2059	
No. of Sets of Nitrocotton	11	
No. of Sets of Strip Paper	3/4	
Mixed Acid used	3586.61 S/tons	
Cotton Waste used	128.26 ,,	gross
	115.23 ,,	nett (see Raw Materials)
Guncotton produced	192.61 ,,	
Saveall	3.62 ,,	
Yield	167.1%	Available for Cordite 164%
Ratio Mixed Acid/Cotton Waste	31.14%	
Mixed Acid/Guncotton	18.63%	

Guncotton issued to services other than for Cordite Manufacture.

3869 1 lb. Guncotton Slabs wet, to C.O.O., Bramley

50 lbs. Guncotton Pulp to R.F.F., Woolwich

3 lbs. of Guncotton Dust to Armstrong Vickers

500 lbs. Guncotton Slabs wet, to C.O.O., Bramley 1-7b.

2 lbs. Guncotton Dust to Armstrong Vickers

200 lbs. Guncotton Pulp to C.S.R.D., Woolwich

80 lbs. Nitro Straw to C.S.R.D., Woolwich.

Total = 4704 lbs.

Fuze Powder R.D. 202.

Reblended 208 lbs. for C.A.S. M.O. 5033

Manufactured 93½ lbs.

Ammonium Perchlorate (crude 224 lbs.) refined.

Raw Materials.

	T.	℄.	lbs.		
Oleum drawn from store	270	10	44	=	302.98 S/tons
Difference in stocks					23.97 ,,
Oleum consumed					279.01 ,,

= 1.45 per lb. of Guncotton.

	T.	℄.	lbs.		
Nitrate of Soda drawn from store	202	0	0	=	226.24 S/tons
Difference in stocks					7.23 ,,
Nitrate of Soda consumed					233.47 ,,

= 1.213 per lb. of Guncotton.

	T.	℄.	lbs.		
Cotton Waste drawn from store	114	10	49	=	128.26 S/tons
Deduct oil and moisture 6.81℄	8.73 S/tons				13.03 ,,
Deduct pickings and fly	4.30				
Nett Cotton Waste used for Nitration					115.23 ,,

Foreign matter removed in picking etc.:-	lbs.	℄
Wood, string and metal	780	.3065
Grit	92	.0260
Fly	7742	3.0880

Cotton used per lb. of Guncotton 0.6659 Gross

0.5983 Nett

Summary of Consumption and Losses - S/Tons.

Operation	H_2SO_4		HNO_3	
	Actual	per ton of G/C.	Actual	per ton of G/C.
Manufacture of Nitric Acid	204.95	1.065	2.79	.0145
Redistillation	10.05	.0522	10.65	.0553
Concentration	13.31	.0691	-	-
Nitration	50.76	.2635	159.35	.8275
	279.07	1.4498	172.79	.8973

Nitroglycerine Section.

A. Manufacture of Nitric Acid.

78 runs at 30 cwt. of Nitrate of Soda.

Average time of distillation $11^1/_2$ hours.

Materials and Results.-

Nitrate of Soda used	131.04 S/tons	at 99.20%	$NaNO_3$
C.O.V. used	112.24 ,,	at 91.74%	H_2SO_4
Oleum used	21.75 ,,	at 20%	SO_3
Coke	22.45 ,,		

Strong Nitric Acid made	90.55 S/tons	at 91.24%	HNO_3
Weak Nitric Acid made	14.46 ,,	at 62.46%	HNO_3
Nitre Cake produced	157.25 ,,	at 32.7%	H_2SO_4

Efficiency Strong Acid 86.5%

Total Efficiency - Process 96.0%

Overall 95.31%

B. Denitration of Waste Acid.

25 charges were denitrated in No.1 Tower in 288 hours. Temperature 157° C.

25 charges with about 10 tons of weak Nitric Acid were denitrated in the new tower in 695 hours, average bottom temperature being 140° C.

Output.- Old No. 1 Tower.

Waste Acid denitrated	76.35 S/tons		
Denitrated Sulphuric Acid made	79.112 ,,	at 69.5%	H_2SO_4
Nitric Acid recovered	12.990 ,,	at 56.65%	HNO_3

Output - New Tower -

Waste Acid denitrated	76.75 S/tons		
Weak Nitric Acid added	10.713	,,	at 66.5% HNO_3
Denitrated Sulphuric Acid made	84.843	,,	at 64.7% H_2SO_4
Nitric Acid recovered	5.292	,,	at 91.10% HNO_3
and	12.299	,,	at 71.66% HNO_3

Efficiencies - Old Tower -

Sulphuric Acid - Process 100% Overall 98.10%

Nitric Acid Process and Overall 85.82%

Efficiencies - New Tower -

Sulphuric Acid - Process and Overall 100%

Nitric Acid Process and Overall 86.16%

C. Concentration of Weak Sulphuric Acid.

Concentration for 1516 hours at average dome temperature 113° C.

Output.

Weak Acid concentrated	268.57 S/tons	at 64.09% H_2SO_4	
Strong Acid made	162.10	,,	at 91.67% ,,
Weak Acid made	42.61	,,	at 43.00% ,,
Coke used	38.23	,,	

Efficiency.

Strong Acid 86.33%

Total Process 97.00% Overall 95.68%

D. Redistillation of Weak Nitric Acid. During the latter part of the year redistillation in stills was abandoned temporarily, and the weak Nitric Acid was passed with waste acid through the new Denitration Tower,

13 runs were carried out in Stills.

Output.

Weak Nitric Acid redistilled	30.125 S/tons	at 60.18% HNO_3	
Strong Sulphuric Acid used	43.50	,,	at 93.06% H_2SO_4
Strong Nitric Acid made	16.88	,,	at 89.55% HNO_3
Weak Nitric Acid made	3.80	,,	at 60.58% HNO_3
Sulphuric Acid recovered	56.63	,,	at 71.30% H_2SO_4
Coke used	5.60	,,	

Efficiencies.

Nitric Acid (Strong)	83.32%
Nitric Acid (Process and Overall)	96.00%
Sulphuric Acid - Process 99.70%	Overall 97.40%

E. Acid Mixing. No.2 Mixer used 630 hours.

Output.

Nitric Acid (new) Mixed	90.25	S/tons	at 91.24% HNO_3
Nitric Acid (redistilled) mixed	22.80	,,	at 89.84% ,,
Oleum (20%) mixed	48.75	,,	at 20% SO_3
Oleum (65%) mixed	58.50	,,	at 65% SO_3
Total Mixed Acid made	220.30	,,	

F. Manufacture of Nitroglycerine. 51 charges of 1470 lbs. of Glycerine each were nitrated. Average time of nitration was 71 minutes. and of separation 180 minutes. Average temperature of brine was -11° C. All charges were nitrated at 10° C. Nos. 1 and 2 Washing Houses were used.

Materials and Output.

Glycerine nitrated	37.485	S/tons
Mixed Acid used	210.375	,,
Waste Acid made	153.10	,,
Soda Ash used	2.856	,,
Nitroglycerine made	87.732	,,
Yield	234.04%	

Summary of Tests.

	Maximum	Minimum	Average
Moisture	0.33%	0.09%	0.25%
Heat Test	13 mins.	10 mins.	11¼ mins.
Alkalinity	All under .0005%		

Nitroglycerine was used as follows -

For Cordite M.D.	50.307	S/tons
For Cordite W.	33.172	,,
For Cordite Mark I	1.990	,,
For Cordite R.D.N.A.	1.783	,,
For Dynamite	0.325	,,
For various Experiments etc.	0.155	,,

Summary of Consumption and Losses of Acids.

	H_2SO_4		HNO_3	
	Actual S/tons	Per ton N/G	Actual S/tons	Per ton N/G
Manufacture of Nitric Acid	122.100	1.392		
Denitration	2.123	0.024	3.394	0.038
Concentration	7.512	0.085	-	-
Redistillation	1.045	0.011	0.738	0.008
Acid Mixing	4.088	0.045	9.672	0.110
Nitration	4.098	0.046	75.469	0.860
	140.966	1.606	89.275	1.016

Raw Materials Used.

Nitrate of Soda	1.451	per ton Nitroglycerine
Oleum (20%)	0.803	,, ,,
Oleum (65%)	0.667	,, ,,
Glycerine	0.4273	,, ,,
Soda Ash	0.0326	,, ,,

G. Drying and Weighing Guncotton and Nitro-Cotton. 72 stovings of Guncotton and 2 stovings of Nitrocellulose were dried. Average time of drying was 65 hours. Moistures at the end of drying were Maximum 0.68%, Minimum 0.32%, Average 0.47%. Total amount dried was Guncotton 173.32 S/tons, Nitro-cotton 2.03 S/tons.

Guncotton was used for -

M.D.	105.22 S/tons
Cordite W.	71.69 ,,
Mark I	1.25 ,,
Experiments	0.23 ,,

Nitro-cotton was used for -

R.D.N.A.	1.40 S/tons
Experiments	0.01 ,,

H. Mixing Paste.

Paste mixed -

M.D.	155.53	S/tons
Cordite W.	104.86	,,
Mark I	3.24	,,
R.D.N.A.	7.80	,,
Experiments	0.40	,,
Dynamite made	0.50	,,

I. Tetryl. During the year 123 purifications were carried out; 113 on Grade IA material for the Army and 10 for the Air Ministry.

Output.

For the Army -

Purified			23,172 lbs.
Grade I recovered			22,051 ,,
Lost			1,121 ,,
Acetone used -			
(Old Stock)	14,668	25,550	,,
(Trade)	10,862		
Tetryl issued			16,400 ,,
unfit			1,100 ,,
under examination			4,551 ,,

For the Air Ministry -

Purified	2,012	lbs.
Recovered	1,993	,,
Lost	79	,,
Acetone used (Old stock)	2,265	,,
Tetryl issued fit	1,493	,,
unfit	440	,,

J. Picrite Manufacture. Following is a brief summary of the work

Extractions	126
Fusions	129
Nitrations	40
Purifications	448

From Naturalists report -

Raw Materials used -

Calcium Cyanamide	14.112 S/tons
Ammonium Nitrate	6.244 ,,
Sulphuric Acid	15.000 ,,
Product completed	5.035 ,,

Recovered Sulphuric Acid issued.

Raw Material used per ton of Picrite made -

Calcium Cyanamide	2.80 S/tons
Ammonium Nitrate	1.24 ,,
Sulphuric Acid	2.97 ,,

Picrite was used as follows:-

For R.D.N.A.	4.610 S/tons
Experimental	0.310 ,,

Cordite Section.

The output of Cordite from the presses during the year has been approximately 285 tons, an increase of 82 tons over last year's production. 49% of the output has been on the small screw presses.

The following experimental batches have been manufactured during the year:-

For Service of Ordnance Committee:-

R.D.N./A.	54 lbs.	.052/14"
	400 lbs.	.090/24"
H.P.& H.P.T.	960 lbs.	.045 .055 - .030 (die)
F.535/2	54 lbs.	.022 .027 .046 - .022
H.S.C.T.	15 lbs.	Cut to 0.10" (issued $13^{8}/_{16}$ lb.)
M.D. Reworked with Carbamite		0.5% 1.0% 2.0% 3.0%

396 lbs. @ .160
.072
.0205 (issued 390 12/16 lbs.

R.D.B. Reworked with Carbamite 2%

37 lbs. .080 (die). (Issued 1934-35)

For Research Department -

R.D.N./A.	500 lbs.	.042/33"
	200 lbs.	.042/30"
	400 lbs.	.042/10½"
H.P.T.	100 lbs.	.074 - .026
M.D.	105 lbs.	Size 16/33"
M.D.T.	10 lbs.	.047 - .016 cut to 0.075"
W.T.	20 lbs.	.06 - .02
		.04 - .02
W.T.	28 lbs.	Size 5 - 2
M.C.T.	18 lbs.	Size 5 - 2

Various Compositions (A)	G.C.	N.G.	M.J.	Carbamite
(1)	65%	30%	4%	1%
(2)	65	30	3	2
(3)	80	16	0	4
(4)	90	8	0	2

36 lbs. .055 - .020 cut to .05"
.065 - .020 cut to .05"
.075 - .020 cut to .07"

(B)	G.C.	N.G.	C.M.J.	Pot.Acetate
	70%	25.5%	4.0%	0.5%

12 lbs. .048 @ .022
.0535 - .022
.0585 - .022
.0415 - .015
.0465 - .015
.0515 - .015
.036 - .010
.041 - .010
.046 - .010
.025
.031
.036

For Air Ministry -

H.P.T.	1050 lbs.	.074 - .026

For Small Arms Committee -

M.D.T. 120 lbs. Size 7 - 2

.0695 - .022 (die)

Also Proof Samples for Firing Trials -

M.C. size 8 25 lbs.

size 8/11" 19 lbs.

H.P. sample 6 lbs.

W. sizes $2\frac{1}{4}$, $4\frac{1}{4}$, 8, 12 & 15 326 lbs. (Issued 324 lbs.)

size 11 .092 (die) 37 lbs. (Issued $17^{8}/_{16}$ lbs.)

The following Tables give a summary of the various materials used and the different quantities of sizes manufactured and issued 1933-34.

Table I - Raw Materials and Paste.

	W.	M.D.	Mk. I	RDN	Exptl.	Total
Acetone (Cons.2420-3)	77,286	121,445	1,395	3,005	1,053	204,184
Mineral Jelly (Cons. 187)	-	16,585	366	-	-	16,951
Cracked M.J. (H.H.)	-	-	-	-	5	5
Carbamite (Cons. 5-9)	13,352	-	-	1,284	85	14,721
Paste	209,128	313,535	6,459	15,576	2,488	547,186
N.G. Charges 630-682						
N.G. Batches 1301-1478						
N.C. Batches 24 and 25						
P. Batches 310-348	299,766	451,565	8,220	19,865	3,631	783,047

Table II - Material Incorporated.

M.D. Dough	330,120 lbs.
Rework	-
Mark I Dough	6,825 ,,
Rework	195 ,,
R.D.N.A. Dough	16,860 ,,
Rework	-
W. Dough	222,480 ,,
Rework	-
Experimental Dough	2,578 ,,
Rework (various)	500 ,,
	579,558 ,,

Table III - Cordite Pressed - (a) Small Screw Presses.

M.D.T. 5 - 2	204,075 lbs.		
7 - 2	27,089 ,,		
M.D. $2\frac{1}{4}$	15,070 ,,		
$4\frac{1}{4}$ (Cut)	8,550 ,,		
Experimental M.D. and M.C. (including 396 lbs. Rework)	693 ,,		
		255,797 lbs.	
Mark I, 1/.05	2,960 ,,		
3	145 ,,		
20/S.C.	3,449 ,,		
Experimental	-	6,554 ,,	
R.D.N.A., .052	1,405 ,,		
.042	6,871 ,,		
Experimental R.D.N.A. .052, HPT, HP, F.535/2 etc.	3,318 ,,		
		19,443 ,,	
Experimental R.D.B. Rework	37 ,,		
Experimental W.	265 ,,		
Experimental (various)	48 ,,		
		350 ,,	
		282,144 ,,	

(b) Hydraulic Presses.

M.D. 11/15"	70,150 ,,		
Experimental	-		
		70,150 ,,	
W. 8	176,515 ,,		
W. 11/14.4"	20,560 ,,		
W. 15/17.25"	20,080 ,,		
Experimental W.	146 ,,		
		217,301 ,,	
	Total	287,451 ,,	
	Grand Total	569,595 ,,	

Cbs.

Table IV - Cordite Issued.

M.D. 11/15"	70,150 lbs.		
M.D.T. 5 - 2	202,330 ,,		
7 - 2	22,598 ,,		
M.D. $2\frac{1}{4}$	15,078 ,,		
$4\frac{1}{4}$	8,550 ,,		
Experimental	$687\frac{3}{4}$,,		$319,393\frac{3}{4}$ lbs.
Mark I, 1/.05	2,960 ,,		
3	145 ,,		
20/ S.C.	2,395 ,,		5,500 ,,
R.D.N.A., .042	17,925 ,,		
Experimental RDNA, HPT, HP, and F.535/2	3,724 ,,		21,649 ,,
W. 8	141,275 ,,		
W. 11	20,560 ,,		
W. 15	20,080 ,,		
Experimental	$389\frac{1}{2}$,,		$182,304\frac{1}{2}$,,
Experimental R.D.B.	-		
Experimental (various)	$61\frac{1}{2}$,,		$61\frac{1}{2}$,,
		Total	$528,908\frac{3}{4}$,,

Table V - Percentage Loss, etc.

	M.D.		W.		Mark I	
Paste used	313,535		209,128		6,459	
M.J. or Carb. used	16,585		13,352		366	
Stock Rework 31/3/33	3,310	333,430	-	222,480	42	6,867
Cordite produced	325,551		217,566		6,554	
Stock rework 31/3/34	6,100	331,651	2,050	219,616	120	6,674
Loss	1,779		2,864		193	
% Loss	0.55%		1.32%		2.9%	
% Acetone used	36.8%		34.8%		20.4%	
% M.J. or Carbamite used	5.02%		6.00%		-	

Main Laboratory Section.

Inspection of Raw Materials, intermediate and finished products, etc. The following raw materials supplied by outside contractors have been inspected -

Cotton Waste	128 tons
Glycerine	40 ,,
Acetone	100 ,,
Mineral Jelly	4 ,,
Nitrate of Soda	370 ,,
Soda Ash	8 ,,
Chemical Lead	36 ,,
Calcium Cyanamide	4 ,,
Carbamite	11 ,,
C.C.V.	158 ,,
N.C.V.	432 ,,
Nitric Acid	43 ,,
M.N.T.	40 ,,
Coke	213 ,,
Petrol	390 Gallons
Sodium Sulphite	4 Tons

Intermediate products inspected included -

Nitroglycerine 51 nitrations = 153 washings	78 tons
Guncotton - 180 Batches; 74 Stovings; 5 Service batches	195 ,,
Product "C" - 44 Batches	$4\frac{1}{8}$,,

Finished products inspected included -

410 samples representing	Cordite M.D.	102 Lots	166 tons
	M.D.	5 Batches	
	Mk.I	26 Lots	
	W.	19 Lots	$108\frac{1}{8}$,,
	R.D.N./A.	7 Lots; 7 Batches	$9\frac{3}{4}$,,
	C.E.	112 Batches	11 ,,
	T.N.T.	110 Batches	33 ,,

610 Cordite Batch Samples

290 W. Batch Samples

200 Blend and Stove Samples

80 R.D.N./A. Samples.

Routine inspections for the purpose of process control included the following -

C.O.V. from Nitroglycerine manufacture	60	samples
,, Guncotton	100	,,
Denitrated Acid for N/G	140	,,
,, ,, G/C	90	,,
Nitric Acid for N/G	130	,,
,, ,, G/C	120	,,
Mixed Acid for N/G	17	,,
,, G/C	32	,,
Waste Acid from N/G	47	,,
,, G/C	55	,,
Condensate Acid	120	,,
Nitre Cake from N/G manufacture	20	,,
,, G/C	12	,,
Soda Nitrate for N/G	20	,,
,, ,, G/C	12	,,
Cotton Waste	390	,,
Acetone	300	,,
Mineral Jelly	52	,,
Glycerine	36	,,
Filter-bed Water	210	,,
Vat boiling Water	1260	,,
G/C from Stoves and Weighing Houses	260	,,
Product "A"	140	,,
Product "B"	80	,,
Product "C"	40	,,
Sludge	24	,,
Milled Picrite	30	,,
R.D.N./A.	30	,,
Recovered Petrolite Acids	14	,,

T.N.T. Acids 42 samples

Fuze Powder. 700 lbs. of experimental Fuze Powder Mill Cake were manufactured for finishing by R.F.F.

BUILDING WORKS DEPARTMENT.

PROPERTY.

The gross returns from property attached to the Factory for the last five years are as follows:-

1929	1930	1931	1932	1933
£996	£1,529	£1,537	£1,524	£1,434

The loss on total possible rental from cottage property amounted to £14, and the reduction in this year's total is otherwise caused by the W.D.Constabulary ceasing to pay the O.F. their 1/7th basic contribution for the premises occupied by them.

Apart from the special maintenance on the Superintendent's quarter arising out of a fire in May 1933, expenditure on domestic property has amounted to £553, against an assessed annual value of £1,080.

M.W.B. SUPPLIES.

Consumption of water for the last five years has been as follows:-

1929/30	1930/31	1931/32	1932/33	1933/34
£173	£131	£168	£182	£199

LEE CONSERVANCY CATCHMENT BOARD.

The agreement with this body referred to in last year's report has not yet been concluded. The Board have been very helpful in the matter of dredging. They undertook the necessary work in Powder Mill Cut on repayment, in Cobbin's Brook at 50% of the cost for the navigable portion and free of charge for the remainder, and a section of the Old River Lee serving the Lower Stores Yard, without expense to us.

The Tail Stream, from Hooksmarsh Ditch, forming part of the western boundary of the Upper Works, was also taken in hand at the Board's expense; the bed was thoroughly cleaned out, the banks remade and all growth of shrubs etc. on our boundary fence cleared

and burnt in the marshes.

The flow of water in the valley has fluctuated between a maximum of 8245 cubic feet per minute in April, and a minimum of 1166 cubic feet in December, and the daily averages over the whole of the last five years have been:-

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9.974	9.987	9.973	8.675	2.766

We are now having continuous difficulty in maintaining our head for water transport. A drop in level is occurring at week-ends, and the Water Warders report that in Ramney Marsh pound this drop coincides with pumping operations in the M.W.B. Lee Road Station. As this is a navigation section of the river the matter has been verbally reported to the Catchment Board who are investigating now.

DEPARTMENTAL WORK.

Dredging. Much heavy dredging was carried out by hiring under favourable terms a small dredger from the Lee Conservancy. With its aid all the cuts serving tray Stoves in the Lower Works, which had not been used since the war, were thoroughly cleaned out. In addition, dredging operations were carried out opposite the Hospital, No.5 Boiler House, and in the Mill Head Stream in the Upper Works.

The final 4" section of the Ring Fire Main has been installed.

Two petrol-driven machines were purchased as an aid to our grass cutting operations. These will undoubtedly assist us considerably, except in close proximity to danger buildings.

A section of old timber wharfing was replaced in concrete in the Hoppit Pool.

In connection with the special maintenance already referred to, it was found necessary to increase considerably the Departmental staff, and the following major services were carried out:- Complete renovation of the Nitration House in the Guncotton Section, including new roof glazing; cutting traverses away from timber porches to Guncotton Stoves, and generally restoring the level of these traverses; renewing main paths and surrounds to explosive buildings in all sections.

The Department also rebuilt one Kessler in the Guncotton Section.

FIRE BRIGADE.

The fire at the Superintendent's quarter in May was extinguished by the Waltham Abbey and Ponders End Fire Brigades. Our own firemen were also in attendance.

As a sequel to this fire instructions have been issued to occupiers of Government property in regard to the use of rooms for the purpose of workshops, while negotiations are still in train with a view to obtaining, in similar eventualities, the first call on the services of the professional fire brigade at Ponders End.

There has been no call in the factory throughout the year.

Continual testing of hose and appliances has been carried out; the pumps are all in good condition and the fire squads have carried out their drills satisfactorily.

MACHINERY SECTION.

ORGANISATION.

In order to provide adequate supervision for the increased staff engaged on the general overhaul of plant at the Guncotton Factory, it was found necessary to promote Leading Hand Knight to Temporary Asst. Foreman. Mr.Wilkinson succeeded Mr.Allfrey as Technical Assistant, and in order to cope with drawing Office work a young journeyman was transferred from the Royal Small Arms Factory.

SERVICES.

Production Machinery. A programme of the general overhaul of spare production plant was embarked upon and this has constituted the greater part of the year's work. Fair progress has been made with the Guncotton machinery, but it has been somewhat hampered by the lack of suitable tackle for lifting, transport facilities and machinery for repairing the heavier parts, some of which had not been removed since their original erection. Opportunity has been taken to renew certain parts with more durable materials, and to improve the main driving mechanism. A trial has been made of a fan made entirely of staybrite steel for exhausting acid fumes. This has been in operation over a period of four months and, after a slight initial failure had been overcome, has been quite successful and more efficient than the

original stoneware fan casings and wooden impellers. It is proposed to extend their use. Work at the Cordite Factory has included the overhaul of ten hydraulic presses and the hydraulic services. This service has been completed with the exception of the provision of rope mantlets. As we have not the requisite labour for this class of work it is proposed to place this out to contract. The overhaul of several incorporating machines has also been undertaken in this section, and improvements made in the water cooling services.

Steam Raising Plant and Mains. Following the plans laid down in the previous year, the overhaul of nine of the seventeen boilers in No.7 (Emergency) Boiler House has been nearly completed. The worn-out mechanical stokers have been replaced by new grates for hand-firing, feed pumps transferred from the R.S.A.F. have been installed, and all the boiler mountings either renewed or repaired. These boilers will shortly be ready for trial under steam. An induced draught fan, which will considerably raise the capacity of these boilers, is to be purchased and installed this year. Nos.5 and 6 Boiler Houses have supplied the whole of the steam required by the factory during the year. The cost as compared with the two previous years is as follows:-

1931/32	-	83.728	million lbs.	at 39.5d.	per 1000 lbs.
1932/33	-	96.156	,,	,, 28.19d.	,,
1933/34	-	116.033	,,	,, 30.09d.	,,

The increase in cost over last year is due to the increase in general charges. The efficiency of the plant has been maintained, but it is anticipated that renewals during the next year or two may be somewhat heavier than in the past, as new Superheater tubes will be required in two of the boilers and the feed pumps require overhauling. Steam mains which had been disused for several years owing to the closure of buildings which are now being brought into service have been renewed or repaired and relagged, but there are still a number of mains to be completed this year.

ELECTRICITY.

The cost per unit as compared with the two previous years is as follows:-

1931/32	-	317.532	units	at 3.596d.	per unit
1932/33	-	345.502	,,	,, 2.88 d.	,,
1933/34	-	462.470	,,	, 2.92 d.	,,

The slight increase in cost over last year has been due to the increase in cost of steam mentioned above. The scheme for emergency supply of electricity at the Lower Works from the North Metropolitan Electric Power Supply Co. is about to be put in hand. A contract has been placed for the removal of three worn-out Robey Sets at a credit to the Factory of £396. This will make room for the installation of the Rotary Converter from the Royal Small Arms Factory. It is hoped that the whole installation will be completed by October this year. The two remaining sets will subsequently be overhauled. At the Upper Works the engines and auxiliary plant are in very fair order and minor repairs only should be necessary for some time to come. Motors have been installed to replace steam engines in some of the more remote buildings and I propose to pursue this policy when additional link cables have been provided. The cables are generally in good condition with the exception of a short length at the Guncotton Factory previously reported, which it is not proposed to replace.

HYDRAULICS. A new motor driven hydraulic pump has been installed at the Lower Works to replace a worn-out belt driven pump. Two spare hydraulic pumps with accummlator at the Upper Works have been overhauled during the year. These pumps did not give particularly good service during the late War and I propose to give them an extended trial this year. Several main valves and pipe lines have been put into a good state of repair.

COMPRESSED AIR PLANT. This plant consists partly of motor driven and partly steam driven sets, air receivers and pipe lines. The whole plant is in a fairly good state of repair, but one air receiver is stated by the Insurance Company to be below their requirements in the calculated factor of safety. This receiver will therefore have to be replaced in the near future.

REFRIGERATION PLANT. One of the condensers used in conjunction with this plant at the Nitroglycerine Factory developed serious leakages in the tubes and had eventually to be closed down, leaving us with one refrigerator set only. Steps have been taken to have this

condenser retubed by the makers, and acting on the advice of the Chief Metallurgist we are trying a new type of steel for the tubes. The cuases of the rapid deterioration of the tubes has, unfortunately, not been satisfactorily determined, but I am taking steps which it is ~~confidently expected~~ hoped will prevent deterioration of tubes in the remainder of the plant.

AIR HEATING GUNCOTTON STOVES. The plant, consisting of steam engine, fan and air heater, for supplying hot air to eight additional stoves, has been thoroughly overhauled and put into running order. One of the steam engines has been replaced by an electric motor. A new method of insulating the air pipe lines is being tried out. The material, consisting of sheets of glass silk, has the advantage of being less ~~c~~hstly than the usual insulating materials and is more readily applied.

OTHER SERVICES. Telephones. The cost of maintaining the automatic telephone service at the Royal Small Arms Factory as compared with the magneto system at the Royal Gunpowder Factory is unfavourable to the latter. The average cost per annum over the last three years being £64 for 99 lines at R.S.A.F. and £115 for 40 lines at R.G.P.F. The proximity of trees and the length of some of the lines at the R.G.P.F. accounts for some of this expenditure, but as this expenditure is accompanied by all the usual disadvantages of the magneto system, I am looking into the possibility of the extension of the R.S.A.F. system to include the whole of the R.G.P.F. telephones.

MACHINERY SHOP. I have referred above to some of the difficulties arising when repairs to heavy plant are required. These difficulties are accentuated by lack of space in the Machinery Repair Shops, and I propose to put forward for consideration plans for the extension and rearrangement of the shop at the Upper Works.

OFFICE and STORES.

The increase of activities on both the manufacturing and maintenance sides has had its effect on the office functions; an extra female clerk was entered for the Wages Branch, another worktaker has been temporarily appointed, while the Storehouse staff had to be increased.

One effect of the cessation of Gun Cordite manufacture during March was the necessity of absorbing into manufacturing costs some £1,000 in excess of the service section charges which the normal tariff and F.E. rates produced.

The change-over from M.D. gun cordite to "W" in the middle of the year adversely affected our estimates of costs by about 5d. per lb.; it is expected that this difference between M.D. and W. will be appreciably decreased as time goes on.

Apart from this, our costs of finished products have closely approximated the estimated rates on which the programme was originally built up.

The following schedules are attached:-

Schedule "B" - Annual turnover and production statistics

,, "C" - F.E. comparison

,, "D" - Some comparative material statistics.

R.G.P.F.

SCHEDULE A. (1).

Personnel. 31.3.34.

	Total this year.	Total last year.
Supervisory &c.	45	41
Skilled.	78	43
Semi Skilled.	81	81
Unskilled.	202	117
Women & Girls.	-	-
Boys.	9	6
	415	288
Highest.	415	290
Lowest.	291	274
Average.	354	282
Entries during the year.	131	20
Discharges " " "	5	21
Transfers " " "	17 (Transfers "In" = 9 "Out" = 8)	29

SCHEDULE A. (2).

Nos. and Average of R.G.P.F.

Employees on 1.4.33 and 31.3.34.

Age.	Nos.on 1.4.33.	Nos.on 31.3.34.
65	-	-
64	3	12
63	12	9
62	10	8
61	8	12
60	13	15
59	15	14
58	14	13
57	13	12
56	13	21
55	21	17
54	15	9
53	9	16
52	15	13
51	11	16
50	11	7
49	5	9
48	7	4
47	4	4
46	3	6
45	3	10
44	7	8
43	5	5
42	4	4
41	2	7
40	1	3
39	1	6
38	5	10
37	6	5

Age.	Nos.on 1.4.33.	Nos.on 31.3.34.
36	4	8
35	4	2
34	1	4
33	1	4
32	1	9
31	6	10
30	7	7
29	4	13
28	2	7
27	1	10
26	5	10
25	3	11
24	2	12
23	2	5
22	1	8
21	1	9
20	1	3
19	1	3
18	2	2
17	1	1
16	1	-
15	1	1
14	-	1
	288	415
	Average age = 48.9	Average age = 44.05

R.G.P.F.

SCHEDULE A. (3)

Total strength on 31/3/34.

	Nos.	%
60 and over.	56	13.50
Over 50 and under 60.	138	33.25
" 40 " " 50.	60	14.46
" 30 " " 40.	65	15.66
" 21 " " 30	85	20.48
Under 21.	11	2.65
	415	100.

SCHEDULE B.

R. G. P. F., WALTHAM ABBEY.

ANNUAL TURNOVER.

	Parliamentary Estimate.	Latest Forecast
	£	£
A. Establishments	4,563	4,379
B. Wages	50,150	56,767
C. Materials	59,756	45,025
D. Machinery Contract	2,387	2,833
E. Works Contract	714	2,857
F. Miscellaneous	6,000	5,828
G. Non-effective	6,400	7,244
	£ 129,970	124,933
Add net effect of Materials on I.D.D.'s	500	1,680
	£ 130,470	126,613
H. Productions for -		
Army, Navy, etc.	128,880	130,000
Miscellaneous receipts	1,930	1,685
Sale of Scrap, Old Stores, and Stores issued on repayment	600	455
	£ 131,410	132,140
Less net effect of I.D. Services	5,160	5,760
	£ 126,250	126,380
Balance as shewn below	£ 4,220	233

Incomings.	Parl'y Est.	Latest F'cast	Outgoings.	Parl'y Est.	Latest F'cast
	£	£		£	£
Estimated amounts recoverable in respect of -			Estimated expenditure on New Capital:-		
Depreciation of Buildings & Mains	2,795	2,481	Land	-	-
Depreciation of Machinery	1,475	1,456	Buildings & Mains:-		
Buildings, Mach'y and Mains written off	20	20	(a) Contract	250	110
First Equipment of Shop written off	1,000	740	(b) Departmental	800	410
From S.S. Account	4,220	233	Machinery:-		
			(a) Contract	1,587	1,663
			(b) Departmental	873	810
			First Equipment	1,000	740
			Increase of Stores in Stock	5,000	1,197
	£ 9,510	4,930		£ 9,510	4,930

Approximate Value of all Productions -	This Year	Last Year
	£111,000	£78,000
M.D.Cordite Produced -	lbs.	lbs.
Rifle and Machine Gun	225,000	252,000
Gun	94,000	139,000
W. Cordite Produced -		
Gun	204,000	-
	s.d.	s.d.
Cost per lb. - Rifle	3/4	3/3
Gun (M.D.)	2/9	2/11
Gun (W)	3/3	-

SCHEDULE C.

R. G. P. F., WALTHAM ABBEY.

FACTORY EXPENSE.

Description.		1933/34 Amount	1932/33 Amount
Process Expenses.		£	£
Foremen, Asst.Foremen, etc.		2,172	1,978
Miscellaneous labour		779	703
Consumable Stores		654	340
Gas		12	35
Water		20	20
Steam (Process)		4,318	3,250
Power		3,881	2,635
Refrigeration		2,328	2,361
Compressed Air		2,418	1,963
Maintenance of Plant		9,884	8,064
Maintenance of Buildings		2,825	1,454
Depreciation		827	826
Rates		182	154
Internal Transport		895	779
Balance of Process Expenses		1,595	2,738
Sectional Expenses.			
Management		2,696	2,361
Electric Light		371	249
Gas		68	77
Steam for heating	(1)	3,007	1,817
Maintenance Services		1,665	1,168
Miscellaneous labour		349	325
Laboratory Testing		3,033	3,092
Care and Custody of Departmental Stores		190	190
Allowances	(2)	1,761	1,367
O.T. and N.S. Bonus		177	87
Balance of Sectional Expenses		1,413	866
Credit for Materials returned to store		324	323
General Expenses.			
Superintendence		580	584
Registry, Pay and Order Branches		284	263
Worktakers, Wages and Accounts		739	698
Central Stores	(3)	2,015	4,658
Police, Fire Brigade and Warders		4,173	4,487
Maintenance of Grounds, Mains, Canal, Permanent Way, etc.		5,311	2,432
Non-effective charges		4,988	4,877
Balance of General Expenses	(4)	20,261	7,575
Total		£ 85,547	64,150
Less Subsidy		14,150	14,151
Total Factory Expense		£ 71,397	49,999
Percentage to Direct Labour		661.39	563.43
Direct Labour		£ 10,795	8,874

(1) The increase of 25% in consumption due mainly to severe winter and increased number of buildings in use arising out of increased production.

(2) T.N.T. nightshift and special overtime of maintenance sections at end of the financial year on urgent work arising out of Report on Instability of R.G.P.F. Cordite.

(3) Last year there was a larger write-off on disposal of surplus Gunpowder materials.

(4) Increased expenditure on Idle facilities.

SCHEDULE D. (1).

R. G. P. F., WALTHAM ABBEY.

RAW MATERIAL STATISTICS 1933 - 34.

	Value of Stock		Value of Stock checked by Stocktakers.		Discrepancies		Surplus Stock Sold			
							Book Value		Nett Loss	
	This year	Last year	This year	Last year	This year	Last year	This year	Last year	This year	Last year
	£	£	£	£	£	£	£	£	£	£
Glycerine	40,143	41,207	-	41,207	-	-	-	-	-	-
Other Explosive Materials	15,910	14,592	846	13,979	1 (Def'y)	151 (Def'y)	-	3,596	-	2,241
General	14,742	13,132	12,730	9,281	66 (Surp.)	13 (Def'y)	24	144	19	82
GRAND TOTAL £	70,795	68,931	13,576	64,467	65 (Surp.)	164 (Def'y)	24	3,740	19	2,323

The stocktaking during the year of store materials to the value of £13,576 revealed a nett surplus of £65, equivalent to .48% of the value of stock taken.

SCHEDULE D. (2).

R. G. P. F., WALTHAM ABBEY.

MATERIALS - Price per ton of Main Items (Average Prices given if more than one contract.

Material.	1932/33 £	s	d	1933/34 £	s	d
Acetone	61	6	8	56	8	0
Cotton Waste	53	5	0	51	7	6
Glycerine	45	0	0	46	0	0
Mineral Jelly	13	0	0	11	10	0
Sodium Nitrate	8	10	0	7	15	0
Ammonium Nitrate	19	10	0 +	18	0	0 *
Carbamite	300	0	0	265	0	0
Acid, Sulphuric						
20%	6	1	0	6	1	0
65%	8	11	0	8	11	0
98%	6	1	0	6	1	0
96%	6	1	0	6	1	0
Lead Chemical - Sheet	17	16	8	18	10	0
Pipe	18	6	8	19	0	0
Coal, Mechanical Stoker		17	10½		18	10½
Acid, Nitric, 98%	20	15	0	20	2	6

+Supply by Imperial Chemical Industries

*Supply from Army Stocks.

BUILDING WORKS DEPARTMENT.

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Further, they loaned us a dredger on favourable terms and dredged the whole of the Tray Stove Cuts, which had been untouche for many years, in a thorough manner.

The Tail Stream, from Hooksmarsh Ditch, forming part of the western boundary of the Upper Works, was also taken in hand at the Board's expense; the bed was thoroughly cleaned out, the banks remade and all growth of shrubs etc. on ~~one~~ our boundary fence cleared and burnt in the marshes.

The flow of water in the valley has fluctuated between a maximum of 8245 cubic feet per min. in April and a minimum of 1166 cubic feet in December, and the daily averages over the whole of the last five years have been:-

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DEPARTMENTAL WORK. In addition to the dredging already referred to, the Department carried out operations opposite the Hospital, No. 5 Boiler House and in the Mill Head Stream in the Upper Works, and put the finishing touches to the Board's work in the Tray Stove Cuts where their dredger was unable to turn.

Late in the summer a contract was arranged for the remodelling of the Superintendent's quarter, arising out of the fire there. ~~in March~~. The execution of this work proved unexpectedly difficult, considerable extra expense had to be incurred and the contract was not completed at the end of the financial year.

The final 4" section of the Ring Fire Main has been installed.

Two petrol-driven machines were purchased as an aid to our grass cutting operations. These will undoubtedly assist us considerably, except in close proximity to danger buildings.

A section of old timber wharfing was replaced in concrete in the Hoppit Pool.

In connection with the special maintenance ~~drives~~ duties ~~services~~ ~~institu-~~ already referred to it was found necessary to increase considerably ~~ted to bring the production up to first 50 tons and then 100 tons capacity~~, the Departmental staff ~~was increased to over 100 in~~

strength, and the following major services were carried out.

Complete renovation of the Nitrating House in the Guncotton Section, including new roof glazing.

Cutting traverses away from timber porches to Guncotton stoves and generally restoring the level of these traverses.

Renewing main paths and surrounds to explosive buildings in all sections, ~~and converting vat house and nitrating house in the Guncotton Section into "clean" buildings.~~

The Department also rebuilt one Kessler in the Guncotton Section.

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There has been no call in the Factory throughout the year.

Continual testing of hose and appliances has been carried out; the pumps are all in good condition and the fire squads have carried out their drills satisfactorily.

T.W.W.
4/6/34.

The position with regard to maintenance at the Royal Gunpowder Factory is causing a certain amount of anxiety and requires careful consideration in the near future. Many of the buildings were constructed during the war period, and are of such a nature that maintenance costs will accrue rather heavily in the future. The lagging of steam pipes in connection with steam services, a large portion of which were erected and lagged during the war, are now rapidly deteriorating and will call for fairly heavy expenditure in the not distant future. Generally, there will be a decided tendency for maintenance expenditure to increase over the next few years.

R. G. P. F. ANNUAL REPORT

for the

YEAR 1933 - 34.

STAFF. Mr. Scott, the Managing Chemist, retired in November and his place was filled by the promotion of Mr. H.A.Phillips. The consequential vacancy of Grade I Chemist was filled by the appointment of Mr. A.H.Roberts from R.N.C.F., Holton Heath, as a result of a recommendation by a Selection Board presided over by a Civil Service Commissioner.

Mr. S.F.Hines, Grade II Chemist, was transferred to War Office in January 1934, and Mr. E.C.H.Lawrence was appointed Junior Assistant Chemist in March 1934. The Grade II vacancy has not yet been filled.

The fact that a Grade I Chemist had to be obtained from outside the R.G.P.F. staff, and also that the appointee did not have the specialized experience which is desirable for a man holding such a post, indicated such a serious state of affairs that the matter has been specially reported to you with a recommendation for an immediate increase of two Grade II Chemists to ensure adequate succession.

MAINTENANCE. The increased production programme necessitated the use of certain reserve plant which had not been operative since the war, and the fact that some appreciable attention to both buildings and plant was necessary before it could be used, indicated that generally the reserve facilities as a whole, while perhaps outwardly sound, were suspect when the acid test of actual usage had to be applied.

An exhaustive survey from this point of view was, therefore, made, and it became evident that the war built buildings, together with their associated service connections, had begun to deteriorate somewhat rapidly.

A special report has been made to you, and a certain amount of work has been done during the year to remedy the position - the statistics regarding personnel indicate to what extent extra staff was engaged, while the increased Factory expenses, under the maintenance

It is calculated that, during the three years 1933-34, 1934-5 and 1935-6, some £45,000 will be required in excess of the normal expenditure in connection with the general maintenance of the factory facilities.

Arising ~~also out of this survey~~ two large and important building schemes have been formulated for carrying out during the next five years; the first being a £40,000 scheme to cover the cost of replacing the existing Guncotton stoves with a modern installation of Quinan driers, and the second is the replacement of cast iron stills for the recovery of waste acid by a modern tower process at a cost of some £10,000. The first scheme is primarily designed to ensure safety, while the second is expected to produce economical results of an appreciable nature, especially under emergency conditions.

The ~~Guncotton power~~ scheme referred to in last year's report is being implemented during the current year by the installation of rotary converters, with a connection to the outside power supply, ~~thus freeing a good proportion of boiler capacity which would have been somewhat costly to renovate and maintain.~~

~~As~~ reserve facilities become available for manufacturing purposes they are brought into use periodically with the object of keeping the plant prepared for emergency requirements.

The drought of last year, which appears to be continuing this year, is having a serious effect on the internal transport of the factory which is largely water borne. The most serious aspect of this matter centres round the transport of paste from the Nitroglycerine Factory to the Cordite Section as ~~there is no alternative in existence~~, the Nitroglycerine buildings ~~being~~ are isolated from one another and the rest of the factory by water, the only land connection being by small footbridges.

PRODUCTION. The output programme for the year amounted to some ~~285~~ 300 tons, an increase of ~~50 tons~~ 50% on the previous annual outputs.

The improved cordite suggested by R.G.P.F. and referred to in last year's report (Cordite W.), has given most satisfactory

results in practice, and under the latest instructions it will entirely replace M.D. for all Cannon Cordite. During the year ~~over 90~~ 100 tons of "N" were ~~issued~~ made.

The manufacture of Picrite and R.D.N. Cordite was maintained at a development level only. It may be mentioned that a special milling machine of American origin for carrying out an essential process in Picrite manufacture has given so much trouble this year that home sources of supply of something more reliable are being sought.

A further development in Picrite manufacture is the substitution of a fusion process in an open vessel for the original autoclave process carried out at a pressure of some 150 lbs. per square inch. This is working satisfactorily. All the pressure processes have now been eliminated.

In general the position is clear for bulk expansion of Picrite output if and when required, subject always to the erection of a permanent installation.

The R.N.C. Pilot Plant erected during 1932-33 was put into operation. Experience showed that satisfactory results could only be obtained by continuous working. The best result was obtained in March when 18500 lbs. were produced at 1/6 s.d. per lb. This compares with a total production of some 75000 lbs. at a gross cost of some £9000.

The local problem of disposal of spent acid has received considerable attention but is not yet adequately solved.

Tetryl purification has been carried out throughout the year for the Army and Air Ministry.

A special plant has been installed in connection with the manufacture of Fuze Powder Mill Cake for issue to R.F.F. where it is finished.

The R.D. 208 Fuze Powder Plant has been used for a small amount of reblending and new manufacture.

For some time there has been a suggestion that the stability of M.D. Cordite produced at R.G.P.F. has not been up to the usual high standard, the reason for this is obscure but ~~it~~ is possibly

traceable to the use of linters instead of cotton waste for the manufacture of Guncotton during the years 1928 and 1932. The criticism culminated in M.G.O. deciding in March last that no more Cannon Cordite should be made at R.G.P.F. until certain steps to ensure absolute cleanliness in certain of the manufacturing processes were taken. The cessation of Guncotton manufacture for some two months naturally upset the manufacturing programme somewhat badly, but the position is now clearing.

The question of using wood pulp or straw in place of cotton waste is at present being explored.

During the year a Calder-Fox Scrubber was installed in the Guncotton Section in place of a coke condenser for purifying the exhaust gases from sulphuric acid concentration.

An experimental small scale denitration tower for recovering waste acid was erected and tried out with the object of obtaining information for the proposed large scale scheme already mentioned.

Glycerine Nitrator No.? has been entirely rebuilt during the year.

PARTICULARS OF MANUFACTURE.

Guncotton Section.

Nitric Acid	Soda Nitrate charges -	69 at 2 tons	
		36 at 1.1/2 tons	
		10 at 1 ton	
	Total Nitrate of Soda charged -	226.24 S/tons	crude
		225.10 ,,	pure
	Equivalent HNO_3	166.84 ,,	
	Nitric Acid produced	182.20 ,,	at 90.0%
		164.05 ,,	HNO_3
	Loss	2.79 ,,	
	Effdiency	98.3 %	
	Strong Sulphuric Acid used	217.14 S/tons	at 94.5%
		204.95 ,,	H_2SO_4

Acid charged = 1372.25 S/tons containing	855.54	S/tons	H_2SO_4
	249.05	,,	HNO_3
	267.66	,,	H_2O
Strong Nitric Acid recovered	271.40	,,	at 89.69%
	243.40	,,	HNO_3
Loss	5.65	,,	
Efficiency	97.70%		
Weak Sulphuric Acid recovered	1070.29	S/tons	@ 78.95%
	845.49	,,	H_2SO_4
Loss	10.05	,,	
Efficiency	98.85%		

Concentration of Weak Sulphuric Acid.

Acid charged to concentrator	981.30	S/tons	at 78.52%
	770.53	,,	H_2SO_4
Strong sulphuric Acid produced	805.94	,,	at 93.95%
	757.22	,,	H_2SO_4
Loss	13.31	,,	
Efficiency	98.26%		

Nitration.

No. of Sets of Guncotton	2059		
No. of Sets of Nitrocotton	11		
No. of Sets of Strip Paper	3/4		
Mixed Acid used	3586.61	S/tons	
Cotton Waste used	128.26	,,	gross
	115.23	,,	nett (see Raw Materials)
Guncotton produced	192.61	,,	
Saveall	3.62	,,	
Yield	167.1%	Available for Cordite	164
Ratio Mixed Acid/Cotton Waste	31.14%		
Mixed Acid/Guncotton	18.63%		

Guncotton issued to services other than for Cordite Manufacture

3869 1 lb. Guncotton Slabs wet, to C.O.O., Bramley

50 lbs. Guncotton Pulp to R.F.F., Woolwich

3 lbs. of Guncotton Dust to Armstrong Vickers

500 1-lb. Guncotton Slabs wet, to C.O.O., Bramley

2 lbs. Guncotton Dust to Armstrong Vickers

200 lbs. Guncotton Pulp to C.S.R.D., Woolwich

80 lbs. Nitro Straw to C.S.R.D., Woolwich.

Total = 4704 lbs.

Fuse Powder R.D. 202.

Reblended 208 lbs. for C.A.S. M.O. 5033

Manufactured 93½ lbs.

Ammonium Perchlorate (crude 224 lbs.) refined.

Raw Materials.

	T.	℄.	lbs.		
Oleum drawn from store	270	10	44	= 302.98	S/tons
Difference in stocks				23.97	,,
Oleum consumed				279.01	,,

= 1.45 per lb. of Guncotton.

	T.	℄.	lbs.		
Nitrate of Soda drawn from store	202	0	0	= 226.24	S/tons
Difference in stocks				7.23	,,
Nitrate of Soda consumed				233.47	,,

= 1.213 per lb. of Guncotton.

	T.	℄.	lbs.		
Cotton Waste drawn from store	114	10	49	= 128.26	S/tons
Deduct oil and moisture 6.81%	8.73 S/tons			13.03	,,
Deduct pickings and fly	4.30				
Nett Cotton Waste used for Nitration				115.23	,,

Foreign matter removed in picking etc.:-	lbs.	%
Wood, string and metal	780	.3065
Grit	92	.0260
Fly	7742	3.0880

Cotton used per lb. of Guncotton 0.6659 Gross

0.5983 Nett

Summary of Consumption and Losses - S/Tons.

Operation	H_2SO_4		HNO_3	
	Actual	per ton of G/C.	Actual	per ton of G/C.
Manufacture of Nitric Acid	204.95	1.065	2.79	.0145
Redistillation	10.05	.0522	10.65	.0553
Concentration	13.31	.0691	-	-
Nitration	50.76	.2635	159.35	.8275
	279.07	1.4498	172.79	.8973

Nitroglycerine Section.

A. Manufacture of Nitric Acid.

73 runs at 30 cwt. of Nitrate of Soda.

Average time of distillation $11^1/_2$ hours.

Materials and Results.-

Nitrate of Soda used	131.04	S/tons	at 99.20% $NaNO_3$
C.O.V. used	112.24	,,	at 91.74% H_2SO_4
Oleum used	21.75	,,	at 20% SO_3
Coke	22.45	,,	

Strong Nitric Acid made	90.55	S/tons	at 91.24% HNO_3
Weak Nitric Acid made	14.46	,,	at 62.46% HNO_3
Nitre Cake produced	157.25	,,	at 32.7% H_2SO_4

Efficiency Strong Acid 86.5%

Total Efficiency - Process 96.0%

Overall 95.31%

B. Denitration of Waste Acid.

25 charges were denitrated in No.1 Tower in 288 hours. Temperature 157° C.

25 charges with about 10 tons of weak Nitric Acid were denitrated in the new tower in 695 hours, average bottom temperature being 140° C.

Output.- Old No. 1 Tower.

Waste Acid denitrated	76.35	S/tons	
Denitrated Sulphuric Acid made	79.112	,,	at 69.5% H_2SO_4
Nitric Acid recovered	12.990	,,	at 56.65% HNO_3

Output - New Tower -

Waste Acid denitrated	76.75 S/tons		
Weak Nitric Acid added	10.713	,,	at 66.5% HNO_3
Denitrated Sulphuric Acid made	84.343	,,	at 64.7% H_2SO_4
Nitric Acid recovered	5.292	,,	at 91.10% HNO_3
and	12.299	,,	at 71.66% HNO_3

Efficiencies - Old Tower -

Sulphuric Acid - Process 100% Overall 98.10%

Nitric Acid Process and Overall 85.82%

Efficiencies - New Tower -

Sulphuric Acid - Process and Overall 100%

Nitric Acid Process and Overall 86.16%

C. Concentration of Weak Sulphuric Acid

Concentration for 1516 hours at average dome temperature 113° C.

Output.

Weak Acid concentrated	268.57 S/tons	at 64.09%	H_2SO_4
Strong Acid made	162.10	,, at 91.67%	,,
Weak Acid made	42.61	,, at 43.00%	,,
Coke used	38.23	,,	

Efficiency.

Strong Acid 86.33

Total Process 97.00% Overall 95.68%

D. Redistillation of Weak Nitric Acid. During the latter part of the year redistillation in stills was abandoned temporarily, and the weak Nitric Acid was passed with waste acid through the new Denitration Tower,

13 runs were carried out in Stills.

Output.

Weak Nitric Acid redistilled	30.125 S/tons	at 60.18%	HNO_3
Strong Sulphuric Acid used	43.50	,, at 93.06%	H_2SO_4
Strong Nitric Acid made	16.88	,, at 89.55%	HNO_3
Weak Nitric Acid made	3.30	,, at 60.58%	HNO_3
Sulphuric Acid recovered	56.63	,, at 71.30%	H_2SO_4
Coke used	5.60	,,	

Efficiencies.

Nitric Acid (Strong)	83.32%
Nitric Acid (Process and Overall)	96.00%
Sulphuric Acid - Process 99.70%	Overall 97.40%

E. Acid Mixing. No.3 Mixer used 630 hours.

Output.

Nitric Acid (new) Mixed	90.25	S/tons	at 91.24% HNO_3
Nitric Acid (redistilled) mixed	22.80	,,	at 89.84% ,,
Oleum (20%) mixed	48.75	,,	at 20% SO_3
Oleum (65%) mixed	58.50	,,	at 65% SO_3
Total Mixed Acid made	220.30	,,	

F. Manufacture of Nitroglycerine. 51 charges of 1470 lbs. of Glycerine each were nitrated. Average time of nitration was 71 minutes. and of separation 180 minutes. Average temperature of brine was -11° C. All charges were nitrated at 10° C. Nos. 1 and 2 Washing Houses were used.

Materials and Output.

Glycerine nitrated	37.485	S/tons
Mixed Acid used	210.375	,,
Waste Acid made	153.10	,,
Soda Ash used	2.856	,,
Nitroglycerine made	87.732	,,
Yield	234.04%	

Summary of Tests.

	Maximum	Minimum	Average
Moisture	0.33%	0.09%	0.25%
Heat Test	13 mins.	10 mins.	11¼ mins.
Alkalinity	All under .0005%		

Nitroglycerine was used as follows -

For Cordite M.D.	50.307	S/tons
For Cordite N.	33.172	,,
For Cordite Mark I	1.990	,,
For Cordite R.D.N.A.	1.783	,,
For Dynamite	0.325	,,
For various Experiments etc.	0.155	,,

Summary of Consumption and Losses of Acids.

	H_2SO_4		HNO_3	
	Actual S/tons	Per ton N/G	Actual S/tons	Per ton N/G
Manufacture of Nitric Acid	122.100	1.392		
Denitration	2.123	0.024	3.394	0.038
Concentration	7.512	0.085	-	-
Redistillation	1.045	0.011	0.738	0.008
Acid Mixing	4.088	0.045	9.672	0.110
Nitration	4.098	0.046	75.469	0.860
	140.966	1.606	89.275	1.016

Raw Materials Used.

Nitrate of Soda	1.451	per ton Nitroglycerine
Oleum (20%)	0.803	,, ,,
Oleum (65%)	0.667	,, ,,
Glycerine	0.4273	,, ,,
Soda Ash	0.0326	,, ,,

G. Drying and Weighing Guncotton and Nitro-Cotton. 72 stovings of Guncotton and 2 stovings of Nitrocellulose were dried. Average time of drying was 65 hours. Moistures at the end of drying were Maximum 0.68 , Minimum 0.32 , Average 0.47 . Total amount dried was Guncotton 173.32 S/tons, Nitro-cotton 2.03 S/tons.

Guncotton was used for -

M.D.	105.82 S/tons
Cordite W.	71.69 ,,
Mark I	1.23 ,,
Experiments	0.23 ,,

Nitro-cotton was used for -

R.D.N.A.	1.40 S/tons
Experiments	0.01 ,,

H. Mixing Paste.

Paste mixed -

M.D.	155.53	S/tons
Cordite W.	104.86	,,
Mark I	3.24	,,
R.D.N.A.	7.80	,,
Experiments	0.40	,,
Dynamite made	0.50	,,

I. Tetryl. During the year 123 purifications were carried out; 113 on Grade IA material for the Army and 10 for the Air Ministry.

Output.

For the Army -

Purified			23,172 lbs.
Grade I recovered			22,051 ,,
Lost			1,121 ,,
Acetone used -			
(Old Stock)	14,668		25,550 ,,
(Trade)	10,862		
Tetryl issued			16,400 ,,
unfit			1,100 ,,
under examination			4,851 ,,

For the Air Ministry -

Purified	2,012 lbs.
Recovered	1,993 ,,
Lost	79 ,,
Acetone used (Old stock)	2,265 ,,
Tetryl issued fit	1,493 ,,
unfit	440 ,,

J. Picrite Manufacture. Following is a brief summary of the work

Extractions	126
Fusions	129
Nitrations	40
Purifications	448

[redacted] -

Raw Materials used -

Calcium Cyanamide	14.112	S/tons
Ammonium Nitrate	6.244	,,
Sulphuric Acid	15.000	,,
Product completed	5.035	,,

Recovered Sulphuric Acid issued.

Raw Material used per ton of Picrite made -

Calcium Cyanamide	2.80	S/tons
Ammonium Nitrate	1.24	,,
Sulphuric Acid	2.97	,,

Picrite was used as follows:-

For R.D.N.A.	4.610	S/tons
Experimental	0.310	,,

Cordite Section.

The output of Cordite from the presses during the year has been approximately 285 tons, an increase of 82 tons over last year's production. 49% of the output has been on the small screw presses.

The following experimental batches have been manufactured during the year:-

For Service of Ordnance Committee:-

R.D.N./A.	54 lbs.	.052/14"
	400 lbs.	.090/24"
H.P.A. H.P.T.	960 lbs.	.045 .055 - .030 (die)
F.535/2	54 lbs.	.022 .027 .046 - .022
H.S.C.T.	15 lbs.	Cut to 0.10" (issued $13^{8}/_{16}$ lb.)
M.D. Reworked with Carbamite		0.5% 1.0% 2.0% 3.0%

396 lbs. ⌀ .160
.072
.0205 (issued 390 12/16 lbs.

R.D.B. Reworked with Carbamite 8%

37 lbs. .080 (die). (Issued 1934-35)

For Research Department -

R.D.N./A.	500 lbs.	.042/33"
	200 lbs.	.042/30"
	400 lbs.	.042/10½"
H.P.T.	100 lbs.	.074 - .026
R.D.	105 lbs.	Size 16/33"
R.D.T.	10 lbs.	.047 - .016 cut to 0.075"
W.T.	20 lbs.	.06 - .02
		.04 - .02
W.T.	28 lbs.	Size 5 - 2
M.C.T.	18 lbs.	Size 5 - 2

Various Compositions (A)	G.C.	N.G.	M.J.	Carbamite
(1)	65%	30%	4%	1%
(2)	65	30	3	2
(3)	80	16	0	4
(4)	90	8	0	2

36 lbs. .055 - .020 cut to .05"
.065 - .020 cut to .05"
.075 - .020 cut to .07"

(B)	G.C.	N.G.	C.M.J.	Pot.Acetate
	70%	25.5%	4.0%	0.5%

12 lbs. .048 - .022
.0535 - .022
.0585 - .022
.0415 - .015
.0465 - .015
.0515 - .015
.036 - .010
.041 - .010
.046 - .010
.025
.031
.036

For Air Ministry -

H.I.T. 1050 lbs. .074 - .026

For Small Arms Committee -

M.D.T. 120 lbs. Size 7 - 2

.0695 - .022 (die)

Also Proof Samples for Firing Trials -

N.C. size 8 25 lbs.

size 8/11" 19 lbs.

M.D. sample 6 lbs.

W. sizes $3\frac{1}{4}$, $4\frac{1}{4}$, 8, 12 & 15 326 lbs. (Issued 324 lbs.)

size 11 .092 (die) 37 lbs. (Issued $17\frac{8}{16}$ lbs.)

The following Tables give a summary of the various materials used and the different quantities of sizes manufactured and issued 1933-34.

Table I - Raw Materials and Paste.

	W.	M.D.	Mk. I	RDX	Exptl.	Total
Acetone (Cons.2420-3)	77,286	121,445	1,395	3,005	1,053	204,184
Mineral Jelly (Cons. 187)	-	16,585	366	-	-	16,951
Cracked M.J. (M.M.)	-	-	-	-	5	5
Carbamite (Cons. 5-9)	13,352	-	-	1,284	85	14,721
Paste	209,128	313,535	6,459	15,576	2,486	547,186
N.C. Charge 630-682						
N.C. Batches 1301-1478						
N.C. Batches 24 and 25						
F. Batches 310-348	299,766	451,565	8,220	19,865	3,631	783,047

Table II - Material Incorporated.

M.D. Dough	330,120	lbs.
Rework	-	
Mark I Dough	6,825	,,
Rework	195	,,
R.D.N.A. Dough	16,860	,,
Rework	-	
W. Dough	222,480	,,
Rework	-	
Experimental Dough	2,578	,,
Rework (various)	500	,,
	579.558	..

Table III - Cordite Pressed.- (a) Small Screw Presses.

M.D.T. 5 - 2	204,075 lbs.		
7 - 2	27,089 ,,		
M.D. $2\frac{1}{4}$	15,070 ,,		
$4\frac{1}{4}$ (Cut)	8,550 ,,		
Experimental M.D. and M.C. (including 396 lbs. Rework)	693 ,,		
		255,797 lbs.	
Mark I, 1/.05	2,960 ,,		
3	145 ,,		
20/S.C.	3,449 ,,		
Experimental	-	6,554 ,,	
R.D.N.A., .052	1,405 ,,		
.042	6,871 ,,		
Experimental R.D.N.A. .052, NFT, HE, F.535/2 etc.	3,318 ,,		
		19,443 ,,	
Experimental R.D.B. Rework	37 ,,		
Experimental W.	265 ,,		
Experimental (various)	48 ,,		
		350 ,,	
		282,144 ,,	

(b) Hydraulic Presses.

M.D. 11/15"	70,150 ,,		
Experimental	-		
		70,150 ,,	
W. 8	176,515 ,,		
W. 11/14.4"	20,560 ,,		
W. 15/17.16"	20,080 ,,		
Experimental W.	146 ,,		
		217,301 ,,	
	Total	287,451 ,,	
	Grand Total	569,595 ,,	

Table IV - Cordite Issued.

M.D. 11/15"	70,150 lbs.		
M.D.T. 5 - 3	202,330 ,,		
7 - 2	22,598 ,,		
M.D. $2\frac{1}{4}$	15,078 ,,		
$4\frac{1}{4}$	8,550 ,,		
Experimental	$687\frac{3}{4}$,,		
			$319,393\frac{3}{4}$ lbs.
Mark I, 1/.05	2,960 ,,		
3	145 ,,		
20/ S.C.	2,395 ,,		
			5,500 ,,
N.D.N.A., .042	17,925 ,,		
Experimental NDNA, HPT, HE, and F.535/2	3,724 ,,		
			21,649 ,,
W. 8	141,275 ,,		
W. 11	20,560 ,,		
W. 15	20,080 ,,		
Experimental	$389\frac{1}{2}$,,		
			$182,304\frac{1}{2}$,,
Experimental R.D.B.	-		
Experimental (various)	$61\frac{1}{2}$,,		
			$61\frac{1}{2}$,,
		Total	$528,908\frac{3}{4}$,,

Table V - Percentage Loss, etc.

	M.D.		W.		Mark I	
Paste used	313,535		209,128		6,455	
M.J. or Carb. used	16,585		13,352		366	
Stock Rework 31/3/33	3,310	333,430	-	222,480	42	6,867
Cordite produced	325,551		217,566		6,554	
Stock rework 31/3/34	6,100	331,651	2,050	219,616	120	6,674
Loss	1,779		2,864		193	
% Loss	0.55%		1.32%		2.9%	
% Acetone used	36.8%		34.8%		20.4%	
% M.J. or Carbamite used	5.02%		6.00%		-	

Main Laboratory Section.

Inspection of Raw Materials, intermediate and finished products, etc. The following raw materials supplied by outside contractors have been inspected -

Cotton Waste	128 tons
Glycerine	40 ,,
Acetone	100 ,,
Mineral Jelly	4 ,,
Nitrate of Soda	370 ,,
Soda Ash	3 ,,
Chemical Lead	36 ,,
Calcium Cyanamide	4 ,,
Carbamite	11 ,,
C.O.V.	158 ,,
N.C.V.	432 ,,
Nitric Acid	43 ,,
M.N.T.	40 ,,
Coke	213 ,,
Petrol	390 Gallons
Sodium Sulphite	4 Tons

Intermediate products inspected included -

Nitroglycerine 51 nitrations = 153 washings	78 tons
Guncotton - 180 Batches, 74 Stovings, 5 Service batches	195 ,,
Product "C" - 44 Batches	4½ ,,

Finished products inspected included -

410 samples representing	Cordite M.D.	102 Lots	166 tons
	M.D.	5 Batches	
	Mk.I	26 Lots	
	W.	19 Lots	108½ ,,
	R.D.N./A.	7 Lots, 7 Batches	9¾ ,,
	C.E.	112 Batches	11 ,,
	T.N.T.	110 Batches	33 ,,

610 Cordite Batch Samples

290 W. Batch Samples

200 Blend and Stove Samples

80 R.D.N./A. Samples.

Routine inspections for the purpose of process control included the following -

C.C.V. from Nitroglycerine manufacture	60	samples
,, Gunsotton ,,	100	,,
Denitrated Acid for N/C	140	,,
,, ,, G/C ,,	90	,,
Nitric Acid for N/C ,,	130	,,
,, ,, G/C ,,	120	,,
Mixed Acid for N/C ,,	17	,,
,, G/C ,,	32	,,
Waste Acid from N/C ,,	47	,,
,, G/C ,,	58	,,
Condensate Acid	120	,,
Nitre Cake from N/C manufacture	20	,,
,, G/C ,,	12	,,
Soda Nitrate for N/C ,,	20	,,
,, ,, G/C ,,	12	,,
Cotton Waste	390	,,
Acetone	300	,,
Mineral Jelly	52	,,
Glycerine	36	,,
Filter-bed Water	210	,,
Vat boiling Water	1260	,,
G/C from Stoves and Weighing Houses	260	,,
Product "A"	140	,,
Product "B"	80	,,
Product "C"	40	,,
Sludge	24	,,
Milled Picrite	30	,,
R.D.N./A.	30	,,
Recovered Petrolite Acids	14	,,

T.N.T. Acids 42 samples

Fuze Powder. 700 lbs. of experimental Fuze Powder Mill Cake were manufactured for finishing by R.F.F.

BUILDING WORKS DEPARTMENT.

PROPERTY. The gross returns from property attached to the Factory for the last five years are as follows:-

1929	1930	1931	1932	1933
£996	£1,529	£1,537	£1,524	£1,434

The loss on total possible rental from cottage property amounted to £14, and the reduction in this year's total is otherwise caused by the W.D. Constabulary ceasing to pay the O.F. their 1/7th basic contribution for premises occupied by them.

Apart from the special maintenance on the Superintendent's quarter arising out of a fire in May 1933, expenditure on domestic property has amounted to £553 against an assessed annual value of £1,080.

M.F.B. SUPPLIES. Consumption of water for the last five years has been as follows:-

1929/30	1930/31	1931/32	1932/33	1933/34
£173	£131	£168	£182	£199

LEE CONSERVANCY CATCHMENT BOARD. The ~~arrangement~~ agreement with this body referred to in last year's report has not yet been concluded. The Board have been very helpful in the matter of dredging. They undertook the necessary work in Powder Mill Cut on repayment, in Cobbin's Brook at 50% of the cost for the navigable portion and free of charge for the remainder, and a section of the Old River Lee serving the Lower Stores Yard without expense to us.

Further, they ~~loaned~~ hired us a dredger on favourable terms and with it dredged the whole of the Tray Stove Cuts, which had been untouched for many years, in a thorough manner.

The Tail Stream, from Hooksmarsh Ditch, forming part of the western boundary of the Upper Works, was also taken in hand at the Board's expense; the bed was thoroughly cleaned out, the banks remade and all growth of shrubs etc. on our boundary fence cleared

and burnt in the marshes.

The flow of water in the valley has fluctuated between a maximum of 8245 cubic feet per min. in April and a minimum of 1166 cubic feet in December, and the daily averages over the whole of the last five years have been:-

1929/30	1930/31	1931/32	1932/33	1933/34
9.974	9.987	9.973	8.675	2.766

We are now having continuous difficulty in maintaining our head for water transport. A drop in level is occurring at week-ends, and the Water Wardens report that in Ramney Marsh pound this drop coincides with pumping operations in the M.M.B. Lee Road Station. As this is a navigation section of the river the matter has been verbally reported to the Catchment Board who are investigationg now.

DEPARTMENTAL WORK. In addition to the dredging already referred to, the Department carried out operations opposite the Hospital, No.5 Boiler House and in the Mill Head Stream in the Upper Works, and put the finishing touches to the Board's work in the Tray Stove Cuts where their dredger was unable to turn.

Late in the summer a contract was arranged for the remodelling of the Superintendent's quarter, arising out of the fire there. The execution of this work proved unexpectedly difficult, considerable extra expense had to be incurred and the contract was not completed at the end of the financial year.

The final 4" section of the Ring Fire Main has been installed.

Two petrol-driven machines were purchased as an aid to our grass cutting operations. These will undoubtedly assist us considerably, except in close proximity to danger buildings.

A section of old timber wharfing was replaced in concrete in the Hoppit Pool.

In connection with the special maintenance already referred to it was found necessary to increase considerably the Departmental staff and the following major services were carried out.

Complete renovation of the Nitration House in the Guncotton Section, including new roof glazing. Cutting traverses away from

timber porches to Guncotton stoves, and generally restoring the level of these traverses. Renewing main paths and surrounds to explosive buildings in all sections.

The Department also rebuilt one Kessler in the Guncotton Section.

FIRE BRIGADE. The fire at the Superintendent's quarter in May was extinguished by the Waltham Abbey and Ponders End Fire Brigades. Our own firemen were also in attendance.

There has been no call in the factory throughout the year.

Continual testing of hose and appliances has been carried out; the pumps are all in good condition and the fire squads have carried out their drills satisfactorily.

[3346] P649/1179 10m 6/33 659 G & S 122 Enfield Form 98.

Departmental Memo. No.

Minutes to be numbered consecutively. Sheet No.

A

The increase in steam heating is about 4,000,000 lbs in comparing 1933-34 with 1932-33. This is due to the following contributory causes.

(1) Six more week-ends of continuous Winter Heating.

(2) Winter Heating at G/C factory due to frost

(3) Earlier lighting of boilers on Sundays at No 5 B.H. to ensure that no undue shock occurs on 6" main to Edmondsey.

(4) Opening of 3" steam main to C.E. sieving house

(5) Additional buildings in use in the Cordite Factory.

L.J.
15/6/34.

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1934 - 35.

ANNUAL TURNOVER.

ROYAL GUNPOWDER FACTORY, WALTHAM ABBEY.

	Parliamentary Estimate. £.	Latest Forecast. £.
A. Establishments.	4,436	4,260
B. Wages.	68,300	70,215
C. Materials.	52,376	57,000
D. Machinery, Contract.	8,450	5,290
E. Works, Contract.	3,038	2,855
F. Miscellaneous.	6,200	6,300
G. Non-effective.	8,740	8,500
	151,540	154,420
Add. - Net effect of Materials on I.D.D's.	1,490	1,730
	153,030	156,150
H. Productions for Army, Navy, etc.	144,820	157,500
Miscellaneous Receipts.	2,400	2,000
Sale of scrap, old stores, and stores issued on repayment.	1,600	1,400
	148,820	160,900
Less - Net effect of I.D.Services.	5,790	6,720
	143,030	154,180
Balance as shewn below	10,000	1,970

Incomings.	Parly: Estimate. £.	Latest Forecast. £.
Estimated amounts recoverable in respect of:-		
Depreciation of Buildings.	2520	3230
Machinery.	1575	3245
Mains.	205	260
Write Offs:- Machinery.	250	175
Decrease of Stores in Stock.	2985	-
Transfer from Supplies Suspense A/c.	10000	1970
	17535	8880

Outgoings.	Parly: Estimate. £.	Latest Fore- Cast £.
Estimated Expenditure on New Capital:-		
Buildings:-		
Contract.	1610	69
Departmental.	6250	1676
Machinery:-		
Contract.	6950	2810
Departmental.	2225	1000
Mains:-		
Contract.	476	-
Departmental.	24	125
Land.	-	-
Increase of Stores in Stock.	-	3200
	17535	8880

1934 - 35.

ANNUAL TURNOVER.

ROYAL GUNPOWDER FACTORY, WALTHAM ABBEY.

	Parliamentary Estimate. £.	Latest Forecast. £.
A. Establishments.	4,436	4,260
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Estimated Expenditure on New Capital:-		
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Departmental.	6250	1676
Machinery:- Contract.	6950	2810
Departmental.	2225	1000
Mains:- Contract.	476	-
Departmental.	24	125
Land.	-	-
Increase of Stores in Stock.	-	3200
	17535	8880

1934 - 35.

ANNUAL TURNOVER.

ROYAL GUNPOWDER FACTORY, WALTHAM ABBEY.

	Parliamentary Estimate. £.	Latest Forecast. £.
A. Establishments.	4,456	4,260
B. Wages.	68,300	70,215
C. Materials.	52,376	57,000
D. Machinery, Contract.	8,450	5,290
E. Works, Contract.	3,038	2,355
F. Miscellaneous.	6,200	6,300
G. Non-effective.	8,740	8,500
	151,540	154,420
Add. - Net effect of Materials on I.D.D's.	1,490	1,730
	153,030	156,150
H. Productions for Army, Navy, etc.	144,820	157,500
Miscellaneous Receipts.	2,400	2,000
Sale of scrap, old stores, and stores issued on repayment.	1,600	1,400
	148,820	160,900
Less - Net effect of I.D.Services.	5,790	6,720
	143,030	154,180
Balance as shewn below	10,000	1,970

Incomings. Estimated amounts recoverable in respect of:-	Parly: Estimate. £.	Latest Forecast. £.
Depreciation of Buildings.	2520	3230
Machinery.	1575	3245
Mains.	205	260
Write Offs:- Machinery.	250	175
Decrease of Stores in Stock.	2985	-
Transfer from Supplies Suspense A/c.	10000	1970
	17535	8880

Outgoings. Estimated Expenditure on New Capital:-	Parly: Estimate. £.	Latest Forecast. £.
Buildings:-		
Contract.	1610	69
Departmental.	6250	1676
Machinery:-		
Contract.	6950	2810
Departmental.	2225	1000
Mains:-		
Contract.	476	-
Departmental.	24	125
Land.	-	-
Increase of Stores in Stock.	-	3200
	17535	8880

1934 - 35.

ANNUAL TURNOVER.

ROYAL GUNPOWDER FACTORY, WALTHAM ABBEY.

	Parliamentary Estimate. £.	Latest Forecast. £.
A. Establishments.	4,436	4,260
B. Wages.	68,500	70,215
C. Materials.	52,376	57,000
D. Machinery, Contract.	8,450	5,220
E. Works, Contract.	3,038	2,855
F. Miscellaneous.	6,200	6,300
G. Non-effective.	8,740	8,500
	151,840	154,420
Add. - Net effect of Materials on I.D.D's.	1,490	1,730
	153,030	156,150
H. Productions for Army, Navy, etc.	144,820	157,500
Miscellaneous Receipts.	2,400	2,000
Sale of scrap, old stores, and stores issued on repayment.	1,600	1,400
	148,820	160,900
Less - Net effect of I.D.Services.	5,790	6,720
	143,030	154,180
Balance as shown below	10,000	1,970

Incomings. Estimated amounts recoverable in respect of:-	Parly: Estimate. £.	Latest Forecast £.
Depreciation of Buildings.	2820	323
Machinery.	1575	324
Mains.	205	26
Write Offs:- Machinery.	250	17
Decrease of Stores in Stock.	2985	-
Transfer from Supplies Suspense A/c.	10000	197
	17835	887

Outgoings. Estimated Expenditure on New Capital:-	Parly: Estimate. £.	Latest Fore-cast. £.
Buildings:-		
Contract.	1610	60
Departmental.	6250	1676
Machinery:-		
Contract.	6950	2810
Departmental.	2225	1000
Mains:-		
Contract.	475	-
Departmental.	24	125
Land.	-	-
Increase of Stores in Stock.	-	3200
	17535	8880