WASC ZZOZ

FONDERS ON SHELF VARIOUS REPORTS

# **1935-1936 Annual Report**

Cordite Output 1
Vortex Potcher 3
Reduced Solvent Acetone 4
Picrite 5
Purification of C.E. 18
TNT 18
Main Production 19
Cordite Grades 27
War Emergency Output Plans 28
Staff - Appendix 6

Nitroglycerine Section - Quinan Stove 1

MINUTES SHOULD BE NUMBERED CONSECUTIVELY.

SIR.IFCT.		W.O.	Etc.	NUMBERS
Supply	annual Report	NA REINA AND PROPERTY OF THE PERSON OF THE P		
Tarani Januari	1920 23	PHYLLINGEROOD		
(E.D.		ACHARIDO DO ATABACA DE MARRIEDA		

Separate Sub-numbered sections are provided where there are two or more distinguishable sections or interests in the correspondence. "Action Here" Slips will be inserted by the Registry as a guide in minuting.

Use only nemental Minute Sheets (Form 98) for internal correspondence

ERRED TO	DATE	REFERRED TO	DATE	REFERRED TO	DATE
			F		
		and the country of th			
		Septimination of the septimina			
		disappenta and appendix			
		and Constitution of the Co		Name of the state	
				No.	
4.					
					· · · · · · · · · · · · · · · · · · ·
16					
TU					
OT DO FOR MET MAKE THE FOR A SHARE WAS A S					

MINUTES	SHOULD BE	NUMBERED	CONSI	ECUTIVE	_Y.
SUBJECT:	Mylo	1	٠	W.O. Etc.	NUMBERS
> Supply	annual 103	5-36	1		
5	1			v	
(F.P.		)			
	Bernedåers andre til kannta stad det er en oppsykliket en skrivet skalle kannensamer, meksyklene en en en en e I	nczeonewanian powieczne po	ang ang kang kang ang kang an	ON THE REAL PROPERTY OF THE PR	and and the analysis of the second

Separate Sub-numbered sections are provided where there are two or more distinguishable sections or interests in the correspondence. "Action Here" Slips will be inserted by the Registry as a guide in minuting.

Use only Descrimental Minute Sheets (Form 98) for internal correspondence

EFERRED TO	DATE	REFERRED TO	DATE	REFERRED TO	DATE
			Ĭ.		
			-		
	i				
				79	
5					
		5.			
	4				
	9				
		7 × 1,2 ×		*()	
116					
146					9
	and the state of t				

W. 325/15

D.O.F.

I forward herewith Annual Report on the Royal Gunpowder Factory, Waltham Abbey, for the year 1935-36, (two copies).

6.8.36.

Superintendent, Royal Gunpowder Factory.

ANNUAL REPORT

OF THE

SUPERINTENDENT, ROYAL GURPOWDER PACTORY, WALKMAN ARREY

FOR THE

YEAR 1935 - 36.

# INDAX.

I. GH	TRAL SIRVEY.			,		Laca
7	fantsoturo			0 0 4	* 0 0	2
*	and a manufacture and a series after a discontinuous after	A0140				1
		Guncotter		0 5 0		
						93
		Piorite a				2 3 4 5
			0 0.0			25
			on R.D. 2			5
		Gunponder	II. THE PER SECURIT	8 8 8		6
		Main Labo	men of many	***	***	6
		ACCOUNT OF A THE ACCOUNT	s Inspect	den ar	9 9 4	U
			during a			9
		and the second	s waste waste on	ACOUNTAINS COME.	many a	8
	Services -	Mydraulic	III	000	* * *	P
,	Mandania in consideration		d Air Flo		***	ij
		There was an area	tion Plan	andit.	8 4 4	ė
			ME oro		***	ã
		and another than	and the same	444	0.00	8 8
		There were the second		9 8 8	***	0
		The control of the second	Shop	40 0	***	623
		The care was and	rvancy Bo	e e e		8
						639
		ELECTION DE TE	:040	* * *		9
			***	9 6 9	***	W
	Property		***	***	***	•
•	a to defend off	***		* * *	***	· ·
		tro of Mit			6 & D	10
	Redistil	lation			* * *	20
		stion of W			cia	10
	Mitration	8 00 001			***	10
	de commune de de de de se	a oto. Isa	Med	0 6 8		10
	Materials		400			22
	Sumary (	ng consumi	stion and	Losses	* *	11
	672 M day on a 1972 and a 1972 an					
4	Mitroglyceri:					2 43
		we of Mit			李雍 李	11
		ion of Vac			* * *	12
		stion of W				18
	man and an open set of the state of the	lation of		contract dis contract distribution		1.2
	Aoid Miz:				404	12
		re of Mit				12
		of Consum				13
		dals				13
		d Woighir				13
	raste Mil	cing	***	* * *		14
4	Cordite Secti	l eten			· val	
,		iale			***	14
	The state of the s	Incorpore			***	14
		rossei.		4	***	13
		rrousya Csoued			***	16
		mdar Inoj			***	16
		se Posses marat Turi				17
	TAT CAME OF		9 0 6	* * *	***	All I
	Potryl Manuf	otura -				
		re of Mit	Bina nie		0.00	27
	Mitratio	and the second of the second of			***	17
		tion and B				18
	Other Wes		410			
	the second of the second	1 424 B B B		* * 9	* * *	20

II.	TOTAL PRODUCTIO	IIS (Co	nta.)	•			2000
	Piorite Menui						
	output	***	**	***		***	10
	Piorite Le	6010d .	**	**	***	***	10
	T.N.T. Manufe	wture	* *		***	**	18
	Pupe Ponder (		100		o.202)		
,	Mamifactur	.0	**	***	* * *	***	18
III.	MAIN PRODUCTIO	All Same			7	*	
	Strangery (	**	W W		***		29
			,		y. 4 ×		
IV.	NET MEERODS.						
	Solvent Reduc	tion .	* *	* * *	***	***	19
	Blank Cutting	6 0	**	0 4 4		***	19
	Gameotton Pot	ching			***	* * *	19
	Treatment of	Carbes	uite b	ofore	Sievin	8 .	19
10MP							eth eth
¥ •	URCIEVA OBDIERS, .	(49 6	**	***		\$ 8 W	20
WI.	ENPEROMENTAL OF	0)888.			* * * *	* = *	
							-
	Cordite .		**	* * *	***	* * *	20
					* * *		22
****	SERVICES.	, .					
V ALAE V	And the second					•	
	Steam				***	0 8 8	22
	Electricity .		* *	***		**	23
weathfritte one	The state of the s						-
VILI	· MAINTERARCE.			* * *	***	***	23
TX.	COST OF PRODUCT	TORS .		* * *		* * * * * * * * * * * * * * * * * * * *	27
		acomplete property and a second			000	***	
X.	PACTORY EXPENSE		***		***		27
AI.	STORIS		4 3	* * *	600	***	27
XII.		Valsto	<u>aks</u>		9 9 0		89
XIII	. GENERAL WAGES	OUTCOM	nons	0.0	* * *	**	28
XIV.	AGES OF THE LO	Halls .	* *	* * 5	***	* * *	20
	ESTABLISMENT.						
	and the control of th						
	Staff	**	* 0	9 4 4			20
	Strongth .	** *	4 4	* * *			28
IVI.	WAR IMPROVED T	ACTIVI	TES		* 6 4		28
		State		#			engrigg?
IVII	· CONCLABBYTHE RE	MALTER			***	***	29

### APPENDICES.

- I. Annual Turnover
- II. Festory Expenses
- III. Meterials:-Prices, Stocktaking, Sale of Surplus Stores.
  - IV. Ages of Employees
- V. Total Strongth
- VI. Personnal.

### ABBUAL REPORT

of the

# SUPERINTENDENT, ROYAL GUNDOWDER FACTORY

for the Year 1935 - 36.

#### I. GENERAL SURVEY.

### (a) Manufacture.

Emergency orders for 122 tons of Cordite received during the latter part of the year, in addition to the estimated output of 500 tons at the beginning of the year, brought the required output of issued Cordite to 622 tons. The achieved output was 623 tons.

The output of Cordite from the presses during the year was approximately 662 tons, an increase of 352 tons over last year's production, i.e. more than double last year's figure.

In eddition to normal manufacture, 5.3 tons of Experimental Cordite were produced. The annual turnover is shown in Appendix I.

The following is a general survey of the manufacturing activities of the Factory:-

(i) Acids Sections. In the Mitroglycerine Acids Section manufacture of mitric acid from sodium mitrate, and sulphuric acid recovered from the spent acid of C.E. mitration, has recommenced.

In the Guncotton Section the denitration bear scheme referred to in last year's report has been shelved for the present, and it has been decided instead to arrange for emergency programme by using No. 1 Hitric Acid Factory mainly as a still house and No. 2 mainly as a retort house. The retort pots installed will, however, be available for either purpose.

The first aluminium nitric acid cooler was recently inspected after some eighteen menths' running. Slight correcton of the coil at the "wind and water line" was observed, but otherwise the condition was excellent.

In the Concentrator House the Calder Fox Scrubber, also mentioned in last year's report, has been subjected to lengthy tests, but has been finally abandened as it appears impossible under any running conditions to produce an exit gas which complies with the regulations of the Alkali Act, without reducing the output of the plant very considerably.

Ho.9 "Bowden" Concentrator has run throughout the year without trouble, and the construction of No.3 has been completed. Repairs to producers are either completed or well in hand.

(ii) Gungetton. Visits to manufacturers' works to supervise the production of cotton waste have continued, and the greatly decreased quantity of pickings in the cotton is evidence of the value of this arrangement.

In the Mitrating House the small central earthenware "biscuits" which protect the cutlet of the mitrating pass are being replaced by stainless steel perforated plates made in the factory. An aluminium exhaust fan designed and made in the factory has been installed and has run for more than half the year with complete satisfaction.

No.2 Nitrating House has been completely overhauled, and special efforts are being made to ensure satisfactory ventilation by the use of enlarged fume pipes and stainless steel exhaust fans, while the waste acid pits are being enlarged to bring them into conformity with those in No.2 House.

All the vate in No.3 Vet House have now been fitted with Tellurium lead kier columns which seem very satisfactory, showing as yet no tendency to lean over as the ordinary lead columns did.

During the year a considerable amount of trouble has been encountered owing to varying alkalinity in the Guncotton. This is considered to have been caused mainly by leaks in those vata which have been lined with Tellurium lead. This material is found to crack very readily when used for yet linings.

Two vate are now fitted with recording thermometers, and it is hoped to complete the installation of these in all vats during the ensuing year.

Nearly all the vats in No.1 House have been repaired and rendered suitable for use under non-specification conditions, and work on No.2 House is in hand.

Reorganisation of the Pulping and Moulding Room, referred to in last year's report, has proceeded. The grit-runs, magnets and blanket runs are now laid out in a convenient and accessible manner with a steady fall, while the filling is of old savealls, removal of stuff-chests and lime tanks, covering of floors and general improvement in the plant lay-out in this building have added greatly to working convenience and lessened chances of contamination of the Guncotton.

The development of the new type of Potcher is entering upon what, it is hoped, will be the final stages. The method of injecting the pulp tangentially into a circular vessel described in last year's report proved very successful on the small scale and, after experiments with a model helding 20 lb. of pulp, a half-ton machine of this type was constructed and is in regular use for Service Cumcotton.

A second mechine of the same size is now erected, and a two-ten machine is under construction. The method seems to give very thorough washing and blending, and the all-lead construction eliminates metallic contamination. The system is economical in power as compared with other types.

Extracts for Service Guncotton were considerably greater than in recent years. No trouble has been experienced with clabs or wet charges, but work on primers was seriously impeded by an explosion which cocurred in No.9 press about the end of November. This was apparently due to a fault in the hydraulic system.

(111) Cordite. The manufacture of M.D.T. 5-2 Cordite has proceeded quite normally, except for a period during March and April and another during November and December when heavy weights per 100° interfered considerably with production, giving irregular cords and increased waste. The reason for abnormal

weights could not be ascertained, but was probably connected with the physical and chemical characteristics of the Guncotton.

The introduction of 33% solvent instead of 36% for W.

Cordite has resulted in a saving of Acetone, the consumption having been reduced from 35.5% for last year to 31.8%. This reduction of the quantity of solvent has produced much better working conditions during pressing and packing of the wet Cordite, as the cords are not so sticky. No reduction of Selvent could, however, be made for pressing in the small screw presses because they would not take the extra pressure required for extrusion.

The addition of 0.2% precipitated chalk at the incorporation stage was commenced on 5.12.35, and no difficulty was experienced in manufacture.

The proofs received during the year were satisfactory and no Cordite was rejected.

An improved system of planning and forecasting delivery dates has been installed to meet the need for close estimates required for the Filling Pactories, etc., and this has resulted in exceptionally good adherence to delivery dates in the face of the disorganisation esused by acceptance of emergency orders.

Efficiency of pressing in the hydraulic presses has been improved by increased control. Last year the output of Cordite W. .05? was about 18.2 lb. per pressing; this has been increased by 15% to 21 lb. per pressing.

Improved supervision at the Lower Works has resulted in a marked increase in output of the blending and lotting operations.

Throughout the section, despite the large proportion of new and comparatively inexperienced workers, the accidents to plant, etc., were few and of a minor nature.

(iv) Picrite and R.D.N./A. The manufacture of Picrite and R.D.N./A. has proceeded satisfectorily.

The Picrite plant has been operated three shifts a day during a considerable part of the year, achieving during that

time the largest output from the process that has yet been attempted.

During 1934-35 production of R.D.R./A. Cordite was carried on at a steady rate of one to two weeks' work per period, but during the year 1935-36 output has been confined to the latter half of the year. Rate of production has, however, been raised from about 1600 lb. per week in 1934-35 to about 3000 lb. per week in 1935-36, while total output for these two years was 14 tons and 19 tons respectively.

Owing to increased output the procedure for pressing Cordite R.D.N./A. as laid down by C.S.R.D. has proved unsatisfactory, and certain modifications have had to be made in collaboration with C.S.R.D.

One lot of R.D.N./A. .042/29" was rejected for excessive variations in composition as found by C.I.A. This matter is being investigated by C.S.R.D. and R.G.P.F. as the material was found satisfactory when examined at R.G.F.F. at the time of issue.

War was suspended in order to commence nitration of fresh C.E.

Mitration and subsequent purification to crystal, ground and corned C.E. Grade I has been carried out during the year with an increasing rate of manufacture.

Work has proceeded with a view to modernising and increasing the capacity of the C.E. Factory. In this connection installation of the second large nitrator of 300 galls. capacity has been almost completed, and the capacity of the C.E. purification house has been doubled.

(vi) Composition R.D.202. Early in the year it was decided to renovate all the buildings in this section, and a type of construction using "Insulwood", which has a smoother surface than the "Celotex" previously used, and avoiding all internal projections, has been evolved which appears almost ideal for dusty work of this sort.

Damediately after restarting, a new batch of charcoal was brought into use which gave consistently low barning times, and, in spite of every effort, it has proved impossible to make material to give fast rates of burning. This has caused considerable difficulty in producing material complying with the specification to fulfil extracts. The matter is under further investigation.

(vii) <u>Gumpowder</u>. The work carried out during the year has consisted entirely of the production of Milloake for the manufacture of Fuse Powder S.R.227, the Milloake being transferred to C.S.O.F. for finishing.

The available plant is only suitable for very small outputs. For larger quantities the installation of a more efficient saw for outting the dogwood, mechanical sieves for both wood and charcoal, and a more suitable mill for grinding charcoal are desirable.

The charcoal burner has worked very subcessfully, end all batches of charcoal have been burnt to specification for carbon content with excellent uniformity. The total quantity of charcoal burnt was 1343 lb.

(viii) Main Laboratory. The activities of the Main Laboratory have been very greatly increased during this year by the rising output of the factory.

The total number of routine samples analysed in connection with the inspection of raw materials, intermediate and finished products, was approximately 12,000 as compared with about 5,000 during 1934-35.

The field of experimental and research work has also been greatly increased, both in amount and in scope, and an unusually large number of investigations have been carried out into problems connected with the development of plant, processes and the general running of the factory.

Hotable lines of investigation have been connected with the resistance to correcton of many materials of construction of plant for saids and explosives manufacture, new method for the sisving and washing of C.E., and the alkalinity of Gunoctton during processing.

Plane were developed and prepared for re-arrangement of existing C.E. nitration plant, and the proposed new C.E. nitration plant was designed.

A considerable amount of experimental and research work was undertaken for the Supply Board Technical Establishment, including several investigations on raw materials for T.N.T. manufacture, an investigation of the commercial processes for Carbamite manufacture, and an experimental study of the economic aspects of the present manufacturing process for chloractic ester.

(ix) Continuous Inspection of Cordite during Manufacture. Accommodation has now been provided for representatives of the Chief Inspector of Armaments who were posted in the factory on the recommendation of the Ordnance Committee.

(x) Danger Building Inspectorate. Inspection of Danger Buildings is now under the supervision of a resident Inspector, to whom Danger Building Visitors are directly responsible.

Prior to June 1935, when the new Inspector of Danger Buildings assumed duty, Danger Building Visitors were responsible to the Senior Inspector of Danger Buildings, Royal Aresnal, Woolwich.

The new system has resulted in very much more satisfactory and efficient supervision and co-ordination of the inspecting staff.

Moreover, I am able at once to deal with reports from the Danger Building inspection staff instead of, perhaps, having to wait for the fortnightly visit of an officer from Woolwigh.

#### (b) SERVICES.

- (i) Hydraulics. The hydraulic pumps have continued to give satisfactory service. A further 50 H.P. pump is to be provided next year to replace one of the old pumps.
- (11) Compressed Air Plant. Attention has been given to the oil supply to the air compressers, and this has been con-

pressor. The amount of oil can be regulated very accurately, and the oil has been changed from light oil to a heavy cylinder oil. It is thought that this will lead to a cleaner air supply.

(111) Refriguration Plant. A new condenser for one of the refrigerators at Edmondsay has been taken up for next year (1936-37).

(iv) Air Heating. (Güncotton Store.) Guncotton Store services have been reconditioned and the hot air services of two stores is being altered to give improved circulation of air.

(v) Telephones. Clearing of the trees, etc., in the vicinity of telephone wires has reduced the number of breakdowns in the service.

No further action has been taken concerning the installation of an Automatic Telephone system.

(vi) Transport. Nickel-iron batteries have been purchased to replace four of those originally supplied with the tractors. The capacity of the new batteries is 50% greater.

The new Guncotton lerry purchased last year for transport of Guncotton from Quinton Hill to Edmondsey continues to give satisfactory service.

(vii) Machinery Shop. A new lathe is being purchased to deal with hydraulic press cylinders, and similar heavy work.

water consumed during the last five years has been:-

1931 1932 1935 1934 1935 £168 £182 £199 £192 £289

(ix) Lee Conservancy Board. The Board has undertaken weed outting and clearance of shoals in the W.D. portion of the Small River Lea on repayment by the factory.

The flow of water through the factory has fluctuated between a minimum monthly average of 1,035 cu.ft. per min. during August of 1935 and a maximum of 11,585 cu.ft. per min. in December 1935.

The daily averages over the last five years have been: -

1931	2052	1933	1934	1935
9.973	8.675	2.766	2.405	4.976

(x) Fire Brigade. Inspections have been made of all fire appliances during the year, and they have been found in order. Fire rules and precautions have been well observed throughout the factory.

Three calls were received and the fires were extinguished without difficulty, the damage to property being slight.

An additional hydrant has been fixed, making a total of 85.

Two extra fire squads have been recruited during the year,

one in the Gumcotton Section and one in the Cordite, making a total of six fire squade.

(Xi) Retate. An intensive programme of estate clearance has been carried on during the year.

A number of trees were condemned as being dangerous, and were felled. These trees, and a number of others which had fallen or had been felled on previous occasions, were removed.

The factory area generally has been cleared of undergrowth, etc., and grass has been kept under control.

#### (a) PROPERTY.

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

1951	1932	1933	1984	1935
11,537	21,524	21,434	21,241	£1,145

The expenditure on domestic property has amounted to £552 against an assessed annual value of £1,024. This does not include the special maintenance expenditure on account of the internal redecoration and installation of new fireplaces at 54 Highbridge Street.

# II. TOTAL PRODUCTIONS.

### A. GUNCOTTON SECTION.

```
Nitrio Acid: -
                                  243 at 2 tons
  Soda Nitrate Charges
                                     4 at 1 ton
                                                   = 490 tons
                                  548.80 s.toma Crude
  Total Soda Hitrate charged
                                 = 544.68 ,,
                                                  Pure
                                   403-63
         Equivalent HNO3
                                             9 9
                                                   at 89.85%
  Nitrio Acid produced
                                   441.10
                                            10 3
                                                  HNOS
                                 = 396.33
                                             2 2
                                     7.30
       Loss
                                             9 9
                                    98.20%
       Efficiency
                                  533.44 s.tons at 94.43%
  Strong Sulphuric Acid used
                                 = 503.61 ,,
                                                 HgSO4
Redistillation: -
                                  2565.75 s.tons - containing
  Acid charged to Stills
                                  1559.33
                                                  H2804
                                             2 2
                                   456.57
                                                   HNO3
                                             2 9
                                                   at 89.03%
  Strong Nitric Acid recovered 501.30
                                             2 2
                                 = 446.27
                                                   ROME
                                             9 9
                                    10.30
        Loss
                                             9 9
                                    97.73%
        Efficiency
                                  1984.28 s.tons at 77.47
  Weak Sulph. Acid recovered
                                                  H2SO4
                                = 1536.93
                                            2 2
        Loss
                                    22.40
                                             2 2
       Efficiency
                                    98.60%
Concentration of Weak Sulphurio Acid: -
Acid charged to Concentrator 1949.00 s.tons at 77.35%
                                = 1807.63 ,, H2SO4
1575.69 ,, at 94.3%
  Sulphuric Acid produced
                                             9 9
                                                   Hg SO4
                                = 1484.83
                                             2 2
                                     22.8
        1.088
                                             22
                                     98.55%
        Efficiency
Mitration: -
  No. of sets of Guncotton
No. of sets of Nitrecotton
                                          4,818
                                             33
                                          4,851
                                       8,335.17 s.tons
  Mixed Acid used
                                         298.16 ,,
  Cotton Waste used
                                                        Grees
                                         270.23
                                                        Nott
                                                  2 2
  Guncotton produced Save-all
                                         450.21
                                                  2 2
                                          10.18
                                                   9 9
       Yield
                                         166.6%
                                         162.9%
       Available for Cordite
  Ratio - Mixed Acid/Cotton Waste
                                         30 : 84
           Mixed Acid/Guncotton
                                         18 : 51
Guncotton, etc., Issued to Services (other than
   for Cordite manufacture).
```

1-1b. Slabs to C.O.O. Bramley and Woolwich	12,915	
1-lb. Charges to C.O.O. Weelwich	1,000	
1-os. Primers to G.O.O. Bramley	14,560	
Guncotton Pulp to C.S.R.D.	100 lb.	b
Mitrocotton Fulp to C.S.R.D.	100 16.	4
Guncotton Pulp to Mesers. Vickers'	10 10.	þ
Total - 15,035 lb. = 7.5175 s.tons.		
THE REPORT OF THE PROPERTY OF		

### Materials.

Oleum drawn from Store Difference in Stocks

677 0 20 = 758.25 s.tons 133.10 ,, 625.15

o. lb.

Oleum consumed

### = 1.3885 per 1b. of Guncotton.

Nitrate of Soda drawa from Store 490 0 0 = 548.80 s.tona Difference in Stocks 74.82 ,,

Nitrate of Seda consumed

473.98

#### = 1.053 per lb. of Gungotten.

Cotton Waste drawn from Store 266 4 31 = 298.16 s.tons Deduct Oil and Moisture (.19% and H20 6.27%) 19.26 Deduct Pickings and Fly 8.67 9 9

Nett Cotton Waste used for Mitration

270.23

Foreign Matter removed in picking, etc.:-Wood. string and metal 697 lb. =

Grit

Fly

697 lb. = .1169% 42 lb. = .007% 1660 lb. = 2.785%

Cotton used per 1b. of Gunootton:-0.6622 Gross 0.6002 Nett.

### Summary of Consumption and Leases.

	Hg	504	13	Nos
	Agtual	of G/C.	Actual	of G/C.
Manufacture of Nitric Acid	503.61	1.119	7.30	.0162
Redistillation	22.40	.0497	10.30	.0228
Concentration	22.80	.0506	etán.	4550
Nitration	112.30	.2470	337.88	.7505
Washing out Plant	2.04	.0045	.58	.0008
	663.18	1.4708	355.86	.7903
		Marie Control of the	ACTION AND ACTION ASSESSMENT OF THE PARTY OF	the sales of the s

# B. NITROGLYCERINE SECTION.

#### (a) Manufacture of Nitrie Acid.

The retorts used were:-

No. 10 - 123 runs at 30 owts. of Mitrate of Soda No. 11 - 123 runs at 30 owts. of Mitrate of Soda.

# Average time of distillation - 12 hours.

	Materials and Results:- Nitrate of Soda used C.O.V. used Oleum used Coke used Strong Nitric Acid made Weak Nitric Acid made Nitro Cake produced Efficiency Strong Nitric A	280.72 150.75 48.88 281.80 62.06 495.94	8 • CORB 9 9 9 9 9 9 9 9 9 9	at at at	99.39 MeNO3 86.7 H2SO4 20 free SO3 90.5 HNO3 60.1 HNO3 33.0 H2SO4
Total Efficiency 95.9%	Efficiency Strong Fitric A	eid 83.8%			

### (b) Denitration of Waste Acid.

120 charges of Waste Acid were denitrated in No.1 Tower.

Output: -Waste Acid denitrated 366.00 s.tems (261.94 s.tems H2SO4 (40.18 ,, Denitrated Sulphuric) 367.51 at 71.2% H2SO4 Acid made at 57.6% HNOS Weak Nitrio Acid made 60.00 9 9 Efficiency -1.00% Sulphurie Acid 86.0% Nitrie Acid

# (c) Concentration of Weak Sulphurio Acid.

Concentrators Nos. 2 and 3 were used.

Outout: -Weak Acid concentrated 700.49 s.tens at 67.8% H2SO4 50.21 Coke used 9 9 at 89.3% H2504 Strong Acid mede 461.45 2 9 . 63 45.5% H2SO4 107.58 Weak Aold made 86.7% Efficiency - Strong Acid 97.0% Total Efficiency

### (d) Redistillation of Weak Nitrie Agid.

50 runs were cerried out in No.4 Still.

Average time of distillation was 14 hours.

Output: -131.66 s.tons at 59.1 HNOS Weak Nitric Acid used Strong Sulphuric Acid used 179.55 ,, at 92.9% Hesoa Coke used 35.20 2 2 at 39.8% HNO3 at 56.3% HNO3 Strong Nitrio Acid made 58.98 9 0 38.57 Weak Nitric Acid made 2 3 at 72.9 HgSO4 Weak Sulphuric Acid made 227.79 68.2% Efficiency - Strong Hitric Acid Total Nitric Acid 96.0 Sulphuric Acid 99.5%

#### (e) Acid Mixing.

Output:Nitric Acid, new, mixed
Nitric Acid, redistilled, mixed
Oleum, 20% mixed
Oleum, 65% mixed
Total Mixed Acid made

214.90 s.toms at 90.2% HNO3
at 90.2% HNO3
135.75 , at 20% SO3 (Pres)
136.50 , at 65% SO3 (Pres)
538.32 ,

#### (f) Manufacture of Nitroglycering.

120 charges of 1470 lb. Glycerine each were mitrated.

Average time of nitration was 70 minutes, and sepatation 130 minutes.

Average brine temperature was -1300.

Nitration was carried out in the early part of the year in Nitrator No.1. Hitrator No.2 was then used, and Nitrator No.1 completely rebuilt.

Output: ... 88.200 e.tons Glycerine used Mixed Aoid used 495.000 9 9 6.720 Soda Ash used 20 Waste Acid made 366.000 # # 206.736 Nitroglycerine made .736 234.5% Nitroglycerine Yield

Summary of Tests - Max. Min. Average
Moisture 0.57% 0.10% 0.29%
Heat Test 14 min. 10 min. 12 min.
Alkalinity All under 0.0003.

# Nitroglycerine Usage,

For	Cordite M.D.				150	1	ons
	Cordite W.				566	8	2
	Cordite Mark				997	動	9
Por	Cordite R.D.	R./A.	. 6	0	720	*	9
Fox.	Dynamite				780	3	#
Por.	Sundry Exper	iments	. (		523	ø	9

### Summary of Consumption and Losses of Acids.

		119	2504	HIM	03
		Aotuel Alione	Per ton	Actual Saidha	Per ton
Manufacture of Witric	aoid	299.10	2.447	10.99	0.053
Denitration		1.99	0.010	6.45	0.032
Redistillation		0.72	0.003	10.61	0.051
Cpmcentration		13.46	0.065	630	490
Aold Mixing		13.41	0.065	13.30	0.064
Mitration		9.73	0.049	176.59	0.853
		338.41	2 - 657	217.94	1.053

#### Raw Materials Used (s.tons per ton Mitroglycerine).

Bitrate of	Søda	. 1	492
Oleum, 20%		C	.875
Oleum, 65%		C	0.632
Glycorine		Q	.4266
Soda Ash			0325

#### (g) Drying and Weighing Guncotton and Mitrogotton .

Stoves 2 - 13 were used.

174 Stovings of Guncetton and 4 stovings of Mitrocotton were dried. The average time of drying was 68 hours.

Total amount Gried was - 435.000 s.tons

Ritropotton 5.545 ,,

Gunootton was used as follows: -

Paste, M.D. and W. 421.141 s.tons
Paste, Mark I 1.683 ;
Experiments 1.064 ;

Nitrocotton was used as follows:Paste R.D.N./A. 4.010 s.tone
Issued to C.S.R.D. 0.200 ,,

# in) Paste Mixing.

Paste 1	dixed -	M.D.	182.820	e-tone
		We	435.037	2 2
		Mark I	4.880	9 8
		R.D.N./A.	25.622	9 9
		Experiments	1.586	22
		Dynamite	1.800	2.2

# C. CONDITE SECTION.

# (a) Rew Materials Used.

and the second of the second of the	Commence of the Commence of th	,				
	W a	M.D.	Mark I	rdn/a	Exptl.	Potal
Acetone	293,175	142,157	2,372	8,685	775	447,162
Min. J.	elso	19,256	498	4566	400	19,754
Carb.	55,404	950	460	3,901	158	59,443
Paste	867, 725	362,235	9,761 16	47,175	$3,834\frac{14}{16}$	1,290,731
Rowerk	***	14,040	375	410	1,44716	15,862
•	d Amalyani, aasin naasilaandajahii saaliin in in debilaa ja ja kala ja asind ja asin distri saasila oo saasila	cologos interprismonarios etissorios filogitis, abenira risolarios inter-	endana (and makeupanapalan) and makeupanapalan (and makeupanapalan) was done	ences one for excession of the property	STATE OF THE PARTY OF THE PARTY OF THE PARTY.	endt präktember vor entresitet werkelpropproteit verbeit de de die die de die de die de die de die di
	1,216,3047	537,688	13,006-2	59,759	6,19516	1,832,953 <u>1</u>

Acetone

447,162

Total Incorporated Material (excluding Acetone)

1,385,791

# (b) Rew Material Reference Sumbers.

Nitroglycerine	Charge Nos. 734	400	007
Guncotton	Baton Nos. 1661	-0604	2105
Mitropotton	Million dates after any or Alfred after an	400	33
Piorite	Batch Nos. 734	460	657
Acetone	Consigment Nos.2425	465a	2431
Mineral Jolly	Consignment Nos. 189	essa-	198
Carbonite	Consignment Nos. 14	160	23

# (c) Material Incorporated.

M.D Dough Rework	381,491 14,040
Mark I - Dough Revork	10,259 <u>16</u> 875
R.D.H./A Dough Reverk	51,076
W Dough	923,1297
Rawar'k	*ttp
Experimental - Dough	3,972 <del>]</del> 4
Rowork	1,447,5
	1,385,701%

# (d) Condite Present.

	Presses.	en en en en en en		
Small Arms -	M.D.T. 5-2 7-2	576,592 1,290	with those	
	Mark I 1/.05	3,789	377,832	,
	80 S.C.	5,440		
		An internal contract on a sittle security from an internal	888 c	387,768
Cannon - RDN/	A .029	13,800		
	.042 .082	3,700 12,37218		
	a maga co	16,700	46,27218	
W es	.060 .046	576		
	.040 .036	12,600		
	.016	13.330		
	.104136	28 5 204	79,055	8
	and Proof Sam	ples:-	42 02/20 6	125,32716
W. Modified	d W. chopped		2, 206 <sub>7</sub>	
	M.D.T. chopped		1,48178	
M.D.T. rewe	E de		<b>20</b> 0	
R.D.N./A.			2,670	
F.551/27			2,050	
		*	8,959	
Less take	a from aormal	manufecture	425	
			A SECTION AND THE SECTION AND	8,83426
				entre de la companya del companya de la companya del companya de la companya de l
(11) Nydraulio P	Passa.			(100 Fe) plant of resiliation of section A paging colored account to color-color graphical
Common	W093		129,925	
	W 057		680,700	810,625
Experimental	W.		1,530	THE SECTION SE
	T. from Stran		23776	
	M.D. reworked Carbamite	with }	200	2 000 9
				1,967
				812,592
				SALDER TERRETARI
(111) Summery.				
Small Sorow P			LU,09516	
Hydraulic Fre	5609	400 Marie Carlos	10,628	
		1,5	23,720	
Experimental			10,508 3	00
		2,0	534,828	(6
emerations and the second of t	and PRINCIPAL Control of the Control	and the later part and real annual action of the later of	Control of the second second second second second	100 of carried to the control of the carried to the

(a) Cordite i	ssued (to Inspecti	on).		
Small Arms		358,375		
	7-2	1,290		
		easegapting and services of constitution	359,665	
	Mark I 1/.05	3,789		
	3	657		
	20 3.0.	5,408	ATT ATT ATT ATT	
			9,884	240 410
Cannon	- RDN/A .029	10,587		369,519
	.042	11,727		
	.052	18,9517	•	
		#20/BROWNTHIOSPARATERSON PROSPERS AND ACTUAL PROSPERSON	\$8,200 <sub>18</sub>	
	W. *093	132,405		
	.060	576		
	.057	600,930		
	. 046 . 040	1,900 12,600		
	.036	26,475		
	.01.6	39,790		
	.154136	23,515		
		distribution of the solution of the conditional fields	638,191	ėb.
			description of the property of	876,396
				a raba a a la
Experimente	al and Proof Sampl	0 6 · ·		2,0,0,0,16
	al and Proof Sample		145	2,0,0076
R.D.B. re		mite	145 5,595	2,0,00278
R.D.B. re	oworked with Carba	mite	5,595	2,0,002
R.D.B. re	oworked with Carba orked with Carbami O.T. and chopped	mite		76
M.D. rewe	oworked with Carba orked with Carbami O.T. and chopped	mite	5,595 981 <u>7</u> 6	76
R.D.B. re M.D. rewe M.D., M.I R.D.H./A	oworked with Carba orked with Carbami O.T. and chopped	mite	5,595 98176 1,670 100	76
R.D.B. re M.D. rewo M.D., M.I R.D.N./A. H.P. F.551/27	oworked with Carba orked with Carbami O.T. and chopped	mite	5,595 981 <u>16</u> 1,670 100 2,830	76
H.D.B. re M.D. rewe M.D., M.I R.D.H./A. H.P. F.581/27 W., W.T.	eworked with Carba orked with Carbami O.T. and chopped	mite	5,595 98116 1,670 100 2,830 2,50016	76
R.D.B. re M.D. rewe M.D., M.I R.D.N./A. H.P. F.551/27 W., W.T.	oworked with Carbancerked with Carbanical with Carbanical Carbanic	mite	5,595 981 <u>16</u> 1,670 100 2,830	76
H.D.B. re M.D. rewe M.D., M.I R.D.H./A. H.P. F.581/27 W., W.T.	oworked with Carbancerked with Carbanical with Carbanical Carbanic	mite	5,595 98116 1,670 100 2,830 2,50016	di U
R.D.B. re M.D. rewe M.D., M.I R.D.N./A. H.P. F.551/27 W., W.T.	oworked with Carbancerked with Carbanical with Carbanical Carbanic	mite	5,595 98116 1,670 2,630 2,50016 2,50016	14,10518
R.D.B. re M.D. rewe M.D., M.I R.D.N./A. H.P. F.551/27 W., W.T.	oworked with Carbancerked with Carbanical with Carbanical Carbanic	mite	5,595 98116 1,670 100 2,830 2,50016 23716 46	14 g 2 0 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
R.D.B. re M.D. rewe M.D., M.I R.D.N./A. H.P. F.551/27 W., W.T.	oworked with Carbancerked with Carbanical with Carbanical Carbanic	mite	5,595 98116 1,670 100 2,830 2,50016 23716 46	di U
R.D.B. re M.D. rewe M.D., M.I R.D.N./A. H.P. F.551/27 W., W.T.	oworked with Carbancerked with Carbanical with Carbanical Carbanic	mite	5,595 98116 1,670 100 2,830 2,50016 23716 46	14 g 2 0 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
R.D.B. re M.D. rowe M.D., M.I R.D.N./A. H.P. F.551/27 W., W.T. W. from I	oworked with Carbancerked with Carbanical Ca	mite te	5,595 98116 1,670 100 2,830 2,50016 23716 46	14 g 2 0 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
H.D.B. re M.D. rowe M.D., M.I R.D.H./A. H.P. F.581/27 W., W.T. W. from S W. Modiff	eworked with Carbanterked with Carbanic orked with Carbanic ork. and chopped and chopped of trem led	mite te	5,595 98116 1,670 100 2,830 2,50016 23716 46	14 g 2 0 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
H.D.B. re M.D. rowe M.D., M.I R.D.H./A. H.P. F.581/27 W., W.T. W. from S W. Modiff	oworked with Carbancerked with Carbanical Ca	mite te	5,595 98116 1,670 100 2,830 2,50016 88716 46	14 g 2 0 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
H.D.B. re M.D. rowe M.D., M.I R.D.H./A. H.P. F.581/27 W., W.T. W. from S W. Modiff	oworked with Carbanteried with Carbanical with Carbanical Carbanic	mite te	5,595 98116 1,670 100 2,60016 2,50016 46	14 g 2 0 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
H.D.B. re M.D. rowe M.D., M.I R.D.H./A. H.P. F.581/27 W., W.T. W. from S W. Modiff	eworked with Carbanterked with Carbanic orked with Carbanic ork. and chopped and chopped of trem led	mite te	5,595 98116 1,670 100 2,830 2,50016 88716 46	14 g 2 0 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

80,088

(g) Percentage Loss, et	Q a							
	M.D.		W .		Mark	1	RDN	/A
Paste Used	362,235		367, 725 <u></u>		9,7614		47,175	g
Mineral Jelly or ) Carbamite Added )	19,256		55,404		498		3,901	
Stock Rework 31.3.35	9,310		8,100		3418		900	
	valida (Est legithilis) kapa a japan katan perenden salam stigar stigar	390,801	чествення в при	931,22916	автериялий это ет применения при	10,29418	distribution or his minimum remotion is insulative	51,976
Cordite Produced	379,363 <u>6</u>		893,387 <u>16</u>		9,886		47,54218	
Stock Rework 31.3,36	40000		24,200		10		3,100	
	elendija visikantilini ezvelotvoto o razvunga andikezak	379,363 <u>16</u>	etätetilisia vesiteri lauteri et ja urust rist arvippiritämista.	917,58716	ein-mystaccommunicatementalmen-hagistacch	9,896	ACT SCHOOLSE CHIEF CHI	50,640
Loss		11,45710		13,6481		398 <mark>16</mark>		1,33318
*Percentage Loss	2.89	la .	1.48	<i>j</i>	3.7	4%	2.	61/5
*Fercentage Aceton	35.14	f.	31.77	K	22.3	0,6	2.7.	<b>c</b> o,
**Percentage Mineral Jelly of Carbami used	te) 5.03	Ž.	6.00	þ	4.8	<b>5</b> /k	7.	<b>64</b> /

\*Calculated on Material Incorporated - see C.(c). \*\*Calculated on Dough Incorporated.

### . Manufacture of Tetryl.

(e) Manufacture of Nitric Acid. No.17 Retort - 30 runs at 1: long tone Nitrate of Soda
No.18 Retort - 31 runs at 1: long tone Nitrate of Soda

Average time of distillation 11 hours.

Output.Eltrate of Soda used
Oleum, 20%, used
(C.O.V. recovered from C.E. Waste Acid also used).

Strong Mitric Acid made 63.20 s.tons at 88.1% HMO3 Strong Mitric Acid issued to C.E. Mitration 56.00 , at 88.1% HMO3 Strong Mitric Acid from N/G manufacture of Mitric Acid issued to C.E. Mitration 49.59 , at 90.4% HMO3

(b) Mitration of C.E.
269 Mitrations at 96 lb. Dimethylaniline cach were carried out in Mitrating House No.4

Tar Cil used 13.146 s.tons
Nitric Acid used 105.59 , at 69.2% HNO3
C.O.W., 96%, used 201.75 , at 96% HgSO4
(Waste Acid issued to coppers and then to
Nitric Acid manufacture).

Crude C.E. made 20.200 s.tons (as purified C.E.)

# (9) Purification and Pinishing of C.E.

Crude C.E. purified 20.710 s.tons (as purified C.E.)
Acetone used 26.76 ...
Caustic Sods used 0.55 ...

Finished C.E. issued.Ground 0.500 s.tons
Crystal 2.800 ...
Corned 5.467.

# (4) Other Hork.

Corned C.E. received for grinding Ground C.E. issued		s.tone
	0.636	w w
Crystal C.E. received for repurification) in 1934/35. Acetone used 1935/36	0.050	<b>3</b> 3
Crystal C.E. issued 1935/36	0.772	<b>8 9</b>
C.E. received for repurification in )	0.150	9 P
1934/35. Apotene used 1935/36 ) C.E. corned and issued 1935/36	7.391	
and the same of th	is the party of the wider	# 2

### R. Manufacture of Picrite.

#### Output:-Calcium Cyanamide used 57.57 a.tons Ammenium Nitrate used 21.26 2 2 C.O.V., 98 H2SO4, used 51.37 9 9 Finished Pigrite made 16.917 (Recovered Sulphuric Acid issued to Contractore). Picrite was issued as follows: -To C.S.R.D. 0.775 s.tons 0.250 ,, To N.A.S.O. and R.H.C.F. To R.D.N./A. Peste Mixing 15.898 2 9

## F. Manufacture of T.N.T.

T.N.T. manufactured on the "Pilot" continuous nitrating plant was carried out during the first four periods of the year. After gaining further valuable experience in the running of this process the plant was closed down.

### Output: -

M.N.T. used Nitric Acid, 90%, used C.O.V., 96%, used Recovered Waste Acid used (about 91% HgSO4) Sodium Sulphite Crystals used	} .	15.695 25.865 23.340 91.405 3.898	B. tona
T.N.F. (Sulphited and Finished)		20.914	5 B

# G. Manufacture of Fuse Powder - R.D. Composition No. 202.

Manufactured 1,294 lb.
Ammonium Perchlorate (Crude) 1,092 lb. (Refined)

#### III. MAIN PRODUCTIONS.

Statistics III		Tone		
Cordite	₩ •	444.8		
	M.D.	188.9		
	R.D.N./A.	23.1		
	Mark I	4.9		
	Experimental	Si da Si Nobel de la composition della compositi	667.0	tons
Composi	tion R.D. 202		.647	2 2
Tetryl	- New monufesture	5-467		
	Purified	20.710		
	around .	.500		
	Crystal	2 4 800 ***********************************	29.477	9 9

# IV. NEW METHODS.

- (a) Solvent Reduction. A reduction in the smount of Acetone used in the incorporation of Cordite W. has been made where the Cordite is to be pressed in the hydraulic presses with advantageous results. This is described under Section (a) (iii) of "General Survey".
- (b) Black Outling. Improvements have been made in this plant by the installation of a transparent screen over the feeding end of the cutting machine, and by the provision of a cover for the sieves, reducing the amount of Cordite which falls on the floor.
- (c) New System of Guncotton Potching. Service Guncotton is regularly being processed in the new type of potcher which was devised and developed at R.G.P.F. This type of machine possesses several notable advantages over the older type, and particulars of its present and proposed applications are given in Section (a) (ii) of "General Survey".
- (d) Treatment of Carbanite before Sieving. A pair of small proliminary crushing rolls has been installed over the feed to the sieving machine in order to deal with Carbanite which becomes oaked during storage. This caking has caused considerable inconvenience

in the past and, although the present installation is not an entirely satisfactory solution to the problem, it has led to improved processing.

### Y. URGENT ORDERS.

# VI. EXPERIAGENTAL ORDERS.

A considerable emount of experimental work has been carried out during the year, a summary of the quantities of each type of Cordite is appended.

For Service	or	Ordneno	o Commit	teet
-------------	----	---------	----------	------

For Service of Ordnence Committee	191		
	\$120	Reserved 16.	Issued lb.
M.D. reworked with Carbemite	.059	800	5,595
R.D.B. revorked with Carbamite		signi-	145 ,
W. from Strem Collulose	11	237	23716
H.F.	.045	700	100
w. verious	.154136) .144048) .168056) .072 .112	1,677	1,677
R.D.N./A	.040	250	250
F.551/27 verious	.023 ) .045 )	275	275
	,	9 18 0 15	8,279 m
		THE RESIDENCE OF THE PROPERTY	
Por Sorvice of Small Arms County	t500.	<b>发展的企业的解释</b>	
For Sorvice of Small Arms Count	6-2	\$00	500
Bill the Colorest Street of the Manager Manager of the Colorest of the Colores			
M.D.P.	6-2 ) 9-2 )		
M.D.P.	6-2 ) 9-2 )	500 65 <u>16</u> 565 <u>16</u>	500 65 <u>75</u> ************************************
	6-2 ) 9-2 ) 5-2	600 6576 66576	500 6528
E. D. P.  D. T.	6-2 ) 9-2 ) 5-2	500 65 <u>7</u> 6 565 <u>7</u> 6	500 6516 56516 375 32518
HOLDS CANADA CONTRACTOR OF ANTANY CONTRACTOR OF ANT	6-2 ) 9-2 ) 5-2 .144048 9-2	500 65 <u>16</u> 565 <u>16</u> 565 <u>16</u> 925 <u>16</u>	500 6518 56518 375 32518
E. D. P.  D. T.	6-2 ) 9-2 ) 5-2	500 65 <u>7</u> 6 565 <u>7</u> 6	500 65 <sub>16</sub> 565 <sub>16</sub> 375 325 <sub>16</sub>
HOLDS CANADA CONTRACTOR OF ANTANY CONTRACTOR OF ANT	6-2 ) 9-2 ) 5-2 .144048 9-2	500 65 <u>16</u> 565 <u>16</u> 565 <u>16</u> 925 <u>16</u>	500 6518 56518 375 32518

# For Service of Research Department.

	Sive		2738364 10.	leaued
M.D.T. Various	9-2 10-3 10-4 eto. Dopped	يودامريها وردس والمعجرية كال	156	156
H.D.H./A. various	.040	my se free	500	500
F.551/87 various	: 045 : 023	)	888	835
W.T. and W. Chopped, verious	equ-		770	110
Medified W. compositions for S.A.A., Tubular, Chopped, var.	<b>6</b> 29		sample transfer in the first transfer in	46.
			1,377	2,347
R.G.P.F. Experiments.				
W. Adstone-Alcohol Solvent Triels	Var.		25	406
M.D.T. Rework Triels	5-2		600	and the same
W. Solvent Experiments	.057		360	50 Press
W. Rework Solvent Trials	.057		640	23
W. Trisis with Reduced Dies	.093		30	100
	en e		The state of the s	raintendia (dissipation revision anno propio)

# Total Experimental.

All the GT 1 to		Issued
Research Department	1,377 4,690 <u>7</u> 8	1,347 3,84018
Small Arms Committee	865 16	86528
Ordnance Committee	2,739 <del>18</del>	8,279 <sub>18</sub>
Proof Samples	1,505	73
	MEAN PROPERTY SERVICES CONTINUES OF THE PROPERTY SERVICES	embelogical provincia establica de Constituira a meno está a co-
	10,927	14,10518
	And the first the second secon	design of a property of the pr

# Talla Is

After completion of orders received for f.N.T. the plant was that down.

During the year a total of 20.914 tens was manufactured.

Forther valuable experience was gained, and this has been incorporated in a separate report on the working of the T.N.T. Pilot Flant.

# VII. SEWMES.

(a) Steem. Tenders have been received for lagging the 3" steem main from Press House No.5 to Incorporating House No.3, and also for four boilers at No.7 Boiler House. Alterations have been made to supply steem from No.7 Boiler House to the Tray Stoves. Further alterations at No.7 Boiler House are necessary to make way for the proposed coal telpher and the removal of the old forced draught fans is necessary.

Considerable progress has been made with the boilers under repair at Nos. 1 and 9 Beiler Houses. These are almost completed save for a few minor parts. The brickwork, unfortunately, has suffered more than expected, and considerable work has to be done to put the plant in working condition. A new crane beiler has been purchased, erected and tested for the coal crane at No.9 Boiler House. Six of the nine reconditioned beilers at No.7 Beiler House have been under steam at 100 lb. per sq.im. pressure and a trial under working conditions is being carried out. The induced draught fan will increase the steaming capacity of these beilers. The installation of Becommisers at Nos. 1, 7 and 9 Beiler Houses is being deferred until the emergency arises. There are seven beilers at No.7 Beiler House not reconditioned, and unless another retary converter is installed to give 1918 capacity, these beilers should be put into working order.

No.3 Boiler House, which was that down a few yours ago, has been restarted to supply steam to Edmandsey Engine House only. The increased demand for steam from the Mitroglycerine Section necessitated opening up the Boiler House. Steam for process, heating and power for Mitroglycerine is still being supplied from No.5 Boiler House.

A considerable number of boiler tubes have had to be replaced in the boilers at No.5 Boiler House. Samples of tubes and water before and after treatment have been sent to Hessis. Bebook & Wilcox for report. A continuous blow-down system has been recommended to prevent scaling and mid deposit on tubes, which causes overheating and bulging.

The amount and cost of steam produced, as compared with the two previous years, is as follows:-

			Ala	cost per 1000 lb.
1933	1838-	34	116,083,00	0 30.094.
1934	esspir	35	130,312,00	0 34.614.
1935	<b>KERIN</b>	36	149,292,00	0 39.464.

(b) Electricity. The rotary converters removed from R.S.A.F. to the Guncotton PowertHouse have been set to work and have given excellent service for several months. Provided R.S.A.F. policy permits, the removal of the third retary from R.S.A.F. to R.G.F.F. will be arranged.

It is proposed to continue the supply of electricity from the North Metropolitan Electric Power Supply Co.

The Bellis & Morcom sets are well in hand, and one set has been completed and tested under working conditions.

The repair of the condenser sets is being undertaken by factory labour.

It is considered that the cable serving a number of buildings in the Edmondsoy area should be duplicated, and that determinate an engine drives at C.E. and Picrite Factories should be replaced by motor drives.

The re-organisation of electric cables at the Pulping and Moulding Room requires attention, and the provision of a substation with adequate switching and fusing arrangements is necessary.

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

	The London	Cost per Unit
1933 - 34	462,470	2.924.
1934 - 35	526,280	3.304.
*1935-36	952,699	2.084.

<sup>\*</sup>Includes power supplied by the Worth Metropolitan Electric Power Supply Co.

#### VIII. MAINTENANCE.

Four Guncotton stoves have been thoroughly overhauled and repaired, two of which have been almost entirely rebuilt.

A coke condenser has been rebuilt; also Nitroglycerine retorts, C.E. Packing House and Clearing Store have been reconditioned.

Various Guncotton stove traverses have been raised, and repairs to Guncotton buildings and porches have been carried out.

In the Cordite Factory, Nos. 2, 3, 4 and 7 Incorporating Houses have been reconditioned, and lined with insulating boarding, and hot water supply carried to the machines.

Nos. 2 and 3 Press Houses have been thoroughly repaired, and repairs and re-roofing, including internal and external painting, have been warried out in Nos. 5 and 6 Blanding Houses.

The roof of No.4 Cordite Magazine has been renewed, and considerable progress made with the renewal of the roof of No.2 Magazine.

The traverse of No.1 Magazine has been raised, and general repairs carried out to Cordite Tray Stoves, Stores, Dining and Shifting Rooms, etc.

In the Guncotton Section the brickwork of six retorts and seven Producers in the Guncotton Acid Factory have been rebuilt, including the platforms and coil trays.

The absorption Tower piers and superstructure have been entirely replaced.

No.2 Mitrating House has been repainted and reconditioned.

No.1 Vat House floor has been largely renewed, the vats reconditioned and the building painted internally and thoroughly repaired.

Progress has also been made with the reconditioning of No.2 Vat House.

A foundation and base has been provided for a new 2-ten potcher, and a new waste acid tank foundation has been built.

A coke condenser at the Nitric Acid Factory has been rebuilt.

Throughout the factory the paths between buildings and the surrounds to buildings have been repaired and tar paved. Approximately 4,300 sq.yds. of sand carpet was laid by contract.

Dredging has been carried out continuously throughout the year. The Tray Stove outs and the Black Ditch have been cleared

and the outs in the Nitroglycerine area have been dredged.

In addition to the more important works already enumerated, repairs have been carried out to Shifting Rooms, Dining Rooms and Reeling Houses, Boiler House furnaces, bridges and trolley tracks.

Approximately 3 miles of track have been renewed during the year.

Seven new boats have been supplied by contract during the year, two for the Cordite Section, one for the Hitroglycerine Section, two for Building Works Department and two for the Stores Department.

A programme of estate clearance has been carried out. Dangerous trees have been felled and these, and an accumulation of fellings, removed, and the factory area generally has been cleared of undergrowth, rubbish and debris.

Improvements in the Incorporating Houses has entailed a considerable amount of work in providing scaled entry and exit of steam pipes. All Incorporating Houses, except Nos. 1 and 6, have been provided with a hot water service, and considerable improvement has been made in lighting and switching facilities.

No.2 Vat House has been provided with a ring water main of ample capacity, although the main of the filter system requires to be considerably enlarged to prevent loss of head. The lighting service has been re-wired, and steam service propered.

Stirring gear for Nos. 7, 8, 9 and 10 Acid tanks has been purchased and two tanks fitted up. A new weak waste acid tank with ettrring gear is being erected at the Guncetten Fastery, and six new retorts have been erected in No.2 Nitric Acid Factory. Beaters have now been put in good order. The service plant has been rearranged, and a new design of potcher has been erected and tried out. This has been followed by the 2-ten potcher, and pumps of suitable design and capacity are being purchased from Messrs. Lee, Howl.

The reconditioning of No.2 Nitrating House has made progress and a modern lighting installation erected: The acid service pipes have been renewed and water service connections re-made.

A vacuum pump for Service moulding machines is necessary for emergency output and is being purchased this year.

Guncotton Stove services have been reconditioned and the hot air services of two stoves is being altered to give improved oir-culation of air.

A C.E. Nitrating House has been provided with a complete plant, including electric drive for the main shafting. External lighting for C.E. Furification House has been provided, and considerable improvement made in plant. A forced hot air drying system for a C.E. Stove has been provided.

The new sieving system for Cordite cylinders has been extended to all the small screw presses of No.10 Frees House, and to the cylinders of the hydraulic press houses Nos. 2 and 3. Progress is being made with the cylinders of Frees House No.8, but the construction of the cylinders renders necessary the insertion of a screwed bush to receive the recess for the sieving system.

Mantlets for Press Houses Nos. 5 and 6 are being erected.

Bay No.1, No.10 Press House, has been completed by bringing and erecting presses from quinton Hill.

### IX. COST OF PRODUCTIONS.

Cost of Primoipal Productions for :-

Cordita: -		
M.D. 5 - 2.	s. oĝ.	3. 74.
W.S. (W.054 & .057).	2.10%.	3. 🗞.
H.D.H./A.	5. 3.	6.08.
Picrito.	6. 54.	6. 8.
Composition Exploding, Crystals, Grade I.	5. 1.	46/20
Composition Exploding, Ground, Grade I.	5.113.	650
Composition Exploding, Corned, Grade I.	S. 24.	46(h

# X. PACTORY EXPRESE.

The total F.E. as shown in Appendix II has increased over last year's total by some 238,000.

This increase is again minly due to the accolerated maintenance programme, and in part, to increase in exrength.

The percentage F.E. to direct labour has fallon from 64% to 47%.

#### AL STORES.

The total value of stores held in stock on 31.3.36 was :-

Manufacturing Materials 263,712

Other Items

219,600

Total

283,400

This compares with the value of 31.3.35 as follows :-

Manufecturing Materials £56,272

Other Items

216,360

Total

672,638

Appendix III chows comparative prices paid for various items as between 1934-55 and 1935-56, also the result of Stocktaking and the sale of surplus stores.

#### XII. DAPERIAL RESERVE STOCKS.

The stock of glycerine at the end of the year amounted to some 510 tons, of which 450 tons represented Imperial Reserve.

XIII. GENERAL WAGES QUESTIONS.

During the year the remaining portion of the Morrie Award was restored to Industrial employees, and the full consolidation of Civil Service Bonus for Mon-Industrials was carried out.

XIV. AGES OF EMPLOYEES.

The numbers and average ages of employees on 1st April 1935 and 31st March 1936 are given in Appendix IV.

XV. ESTABLISHMENT.

#### (a) Staff.

Lt. Col. C.G.F. Davidson, D.S.O., was appointed
Inspector of Danger Buildings (27/6/35).

Mr. M.H. Magge was appointed Manager of Building
Works Dept. (Joint) vice Mr. T.W. Watkins.

## (b) Strength.

The total strength of the factory on Slat March, 1936, is shown in Appendix IV, and Appendix V shows the age gradation at that date as compared with the end of the previous year. It is satisfactory to record that the average age has fallen from 42.46 to 37.86. Appendix VI gives a detail of personnel on 31st March 1936 and 1935 respectively.

## XVI. WAR IMPROPRIET ACTIVITIES.

It will be evidenced from the remarks on maintenance that the factory generally is in a very good state of repair.

As a result of a visit to the factory by the Master General of Ordnance and the Director of Ordnance Factories, it has been decided (1) that there is no need in the present outlook to enlarge the Vat House; (2) that in the present outlook, Waltham will be maintained to produce 150 tens Cordite W. and 50 tens Cordite H.D.; (5) that, if anything should occur to modify the present proposals for removal, or to delay action, then the situation must be reviewed.

Also, cartain matters on which action has been suspended pending a decision on removal are enumerated below:-

New lay-out for Totryl Pactory
Restoration of 2 Cordite Stoves
Further progress with Quinan Driere
Denitration Towers for spent soid
Automatic Telephone System
New Machinery Shop.

Collaboration with the Supply Board Technical Establishment continued throughout the year.

The action for the emergency supply of electricity at the Lower Works has been concluded as regards two converters.

## XVII. CONCLUDING REMARKS.

The output progresses for the year permitted of more regular and continuous working of plant, particularly in the manufacture of Gunostton and ancillary operations.

The relations with labour continue to be estimated.

Meetings with the Shop Stewards have been held when considered necessary, for the discussion of questions affecting local conditions and employment.

18,540

16,715

## 1935 - 36.

## AMNUAL TURNOVER.

# ROYAL GUNPOWDER FACTORY, WALTHAM ABREY.

o sesualido o diperio galaci	discreptional and appropriate and appropriate and somewhole and appropriate an		SPONENT A TREATMENT IN COMPANY TO THE PROPERTY OF THE PROPERTY AND A SPONENT AND A SPO		communication and a communication of the communicat			
					PARIA AMENICA	Matalana (Matalana) Pagang kangga Matalana (Matalana) Matalana (Matalana)	OKTANIA KAZI CARRENT PERENCENARI	TO THE PROTECTION OF T
A. B. C. D. E. F.	Establishments. Wages. Materials. Machinery, Contract. Works, Contract. Miscellaneous. Non-effective.	et.			5,335 101,800 77,585 12,285 4,810 6,500 8,300			5,235 110,535 101,425 6,480 3,785 7,630 7,000
				216,615	Managan ya kata ya kata kata kata kata kata kat		242,090	
	Add - Net effect of Materials on I.D.D's			2,000	,	2,900		
			21.0 ; 61.5	ne urakilansuuva sindeleks sindeleks randulendi iradi.	mada and Brasilia Sulphide Ba	244,990		
H.	H. Productions for Army, Navy, etc.				213,410			237,700
	Miscellaneous Rece	eipts.			2,400			2,760
	Sale of Scrap, old stores and stores issued on repayment.				1,200			1,170
				227,010	GANT TENERS AN AMERICAN PROTECTION TO SEE AN APPROXICATION PROTECTION AND THE SECOND PROTECTION	eda na naprocessi de la constante	242 <sub>g</sub> 650	
Less - Net effect of I.D. Services		7,210			7,230			
					209,800	ortidate reprostançan en en en en esta escala de la companya en entre en esta escala de la companya en entre e	TRISCOMBINAL DESIGNATION	234, 400
g o er d'en orde hijde eg generale ge	Balance as sl	newn below.	,		8,815	10,590		10,590
recor	INCOMINGS.  ted amounts verable in	PONT 1 V	TETOST THE TOST		OUTGOINGS.  ted expenditure ew Capital:-	Part	am	Letest Forecast.
Depre Bu: Mad	ciation of:- ildings. phinery.	3,375 3,975 405	3,290 3,280 373	(a)	ings:- Contract. Departmental.	550 3,700		1,570
rit	ten off:- chinery ildings	145	2 160	(a)	nery: - Contract Departmental .	8,285 3,480		4,390 1,900
Ma: Ler	ins.	MOD 6180	845		Contract Departmental.	500 200		525 <b>4</b> 5
	ense Account	8,815	10,590	dep Incre	& other non- reciated assets ase of Stores Stock.	470		9,210
				40K (D-0)	प्रता विकास वि	1100		THE STANDARD THE

18,540

16,715

## R.G.P.P. WAMPIAN ABBEY.

## FAGRORY WERENSES.

Description.	1935-38 Amount £	1934-35 Amount £
Process Expenses.		
Foremen, Asst. Foremen etc. Miscellaneous Labour. Consumable Stores. Gas. Water. Steam (Process). Power. Refrigeration. Compressed Air. Maintenance of Plant. Maintenance of Buildings. Depreciation. Rates. Internal Transport. Balance of Process Expenses.	2,863 1,813 994 44 41 9,758 6,010 4,825 4,542 16,815 2,917 1,394 201 1,770 2,675	2,220 1,134 708 21 21 6,937 4,995 3,749 3,097 15,589 4,461 1,394 192 990 2,537
ectional Expenses.		
Management.  Ricctric Light Gas.  Steam for heating.  Maintenance Services.  Miscellaneous Labour.  Laboratory Testing.  Care & Custody of Departmental Stores.  Allowances.  ).T. & N.S. Bonus.  Balance of Sectional Expenses.  Credit for Materials returned to store.	2,991 584 102 2,616 3,697 954 5,089 345 4,043 450 3,349 598	2,735 628 74 2,540 2,065 560 3,085 205 2,193 190 1,772 490
leneral Expenses.		
Superintendence. Registry, Pay & Order Branches. Worktakers, Wages and Accounts. Central Stores. Police, Pire Brigade and Warders. Maintenance of Grounds, Mains, Canal,	699 495 1,160 5,064 4,219	546 353 829 3,010 4,205
Permenent Way &c. Non-effective Charges. Balance of General Expenses.	13,431 6,436 37,885	9,712 5,493 20,138
Potal.	145,858	107,888
Lose Subsidy.	14 y 8 75	14,873
Total Factory Expense. Percentage to Direct Labour.	130,983 472.90	93,015 641.70
Direct Labour.	27,698	14,495

#### MARERIALS.

Price per ton of Main Items (Average prices given if more than one Contract).

Material.	2.0	Sales representation		192	15-1	26
Acetone	258	8	0	257	8	0
Cotton Wasto	56	14	0	59	2	6
Glycerine	50	0	0	56	10	0
Mineral Jelly	10	4	6	11	16	3
Sodium Nitrate	9	15	0	7	1.5	0
Ammonium Ritrate	27	18	6 1/8	11	0	0
Carbamite	236	2	च्यु अंद दहेद स्था	228	19	10**
Sodium Sulphite	9	2	6		400	
Caloium Cyanamide	9	0	0	9	0	0
Mono-mitrotoluene	4.5	0	0		460	
Acid Sulphuria - 20%	6	1	0	5	16	0
65%	8	11	0	8	8	6
<b>\$3</b> %	6	1	0	5	16	0
96%	5	19	9	5	18	6
Nitrio Acid 98%	29	10	0		400	
Lead, Chemical - Sheet	10	16	8	21	3	4
Pipe	1.6	10	6	21	6	8
Coal, Eschenical Stoker	1	0	10%	1	. 0	54

\*Supply from Army Stocks
\*\*Supply arranged by Director of Navy Contracts.

#### STOCKTAKING.

Yelue.	2.500 X	TALLE OL SI	ock Checked	Marker Seems French
The second secon	TARREST TO THE STATE OF THE STA	This Tear	Lost Year	Rett Surplus
475. Who	£	2	Eur	2
83,400	72,682	10,584	61,311	333

The surplus of £333 revealed in stocktaking is equivalent to 3.1% of the value of stock taken.

### SALE OF STRIPLUS STORES.

Total Amount Realiged

Wett Lose

213

25

# APERAND IN AV

Ago	Resear A.4.98	100-91-31-3-26	ARR	Mosen 14.35	700.00 (1.88.56)
65	4506	40,6	39	14	15
64	4	4	38	2.3	2.6
63	8	11	37	8	16
62	12	12	36	8	27
61	1.1	11	35	8	23
60	12	13	34	9	24
59	2.6	15	53	2.2	26
58	24	12	32	2.2	29
57	11	26	31	13	19
56	26	10 -	30	12	36
55	9	14	29	3.4	30
54	14	12	28	24	22
53	9	23	27	3.0	35
52	18	14	26	2.4	29
51	13	11	28	1.6	24
50	97	8	24	7	22
49	6	13	23	11	31
48	9	2.2	22		81
47	6	22	27	4	22
46	13	1.5	20	4	9
45	70	12	19	5	3
44	10	80	18	2	7
43	*7	3.2	17	3	<b>\$</b>
42	8	1.3	16	3	3
41	3	10	15	1	3
40	6	21	14	2.	1.
				Servedansial Malaumanoria saluar dakaire	and a superior of the superior

au age 39

## AFFERDIK V.

## TOTAL STRENGTH on 31.3.36.

		TOS.	
60 and over	****	51	6 - 23
Over 50 ead	under 60	141	17.22
Over 40 and	under 50	159	16.97
Over 30 and	under 40	221	26.98
Over 21 end	under 30	256	28.82
Vader El		31. 21.0 21.0	3 • 78 ••••••••••••••••••••••••••••••••••

## AFFEDIA VI.

## PERSONNEL - 31.3.36.

	Total this Year	Total last Year
Supervisory, etc	63	49
Skilled	121	66
Semi-skilled	142	79
Unakilled	469	279
Women and Girls	1	- da
BOYS	Contract Con	2.5
	819	488
Highest	628	433
Lougs	488	598
Average	669	442
Entries during the year	398	3.53
Discharges during the year .	67	63
Transfers during the year	30	22
(Transfers	"In" (18)	(18)
	"Out" (12)	(10)

### ANNUAL REPORT - GUNPOWDER SECTION - 1935-36.

The work carried out during the year has consisted entirely of the production of Millcake for the manufacture of Fuze Powder S.B. 227, the Millcake being then transferred to C.S.O.F. for finishing.

The manufacture consists essentially of three processes:-

- (1) Charcoal burning, grinding and sieving;
- (2) mixing Saltpetre, charcoal and sulphur;
- (3) milling.
- (1) Charcoal Burning. The dogwood is cut into suitable lengths (about 3") in a small rotary saw, ground up in a Harrison-Carter disintegrator, sieved by hand, and burnt in a rotary burner. The Charcoal is ground in an edge runner mill and again hand sieved.

The plant is fit only for very small outputs, and handsieving of both wood and charcoal is very objectionable work.

For larger outputs, the following plant is desirable - a more
efficient saw, well confined mechanical sieves both for charcoal
and wood, and a more suitable mill for grinding charcoal.

The charcoal burner has worked very successfully, and all batches of charcoal have been burnt to within the specification limits for carbon content. Quantity of charcoal burnt was 1348 lb.

- (2) Mixing. All the mixing has been done by hand, and for larger outputs some kind of mechanical mixer should be installed.
- (3) Milling. The conditions for milling are received from the Superintendent, Royal Filling Factories. These are being continually changed, and it is evident that the proper conditions for finishing the powder have not yet been arrived at. The charcoal supplied during the year has been exceedingly uniform, and the cause for the wariations necessary in the milling should be looked for elsewhere.

Both Nos: 5 and 7 mills are being used alternatively, all made trials being carried out in No.5, and an attempt to arrive at the conditions in No.7 from these trials, but in spite of many trials, a definite time for No.7 has not yet been reached to give the necessary speed of burning. Millcake made in No.5 mill - 2,800 lb; and in No.7 mill - 5,040 lb.

1915/36

## WORK CARRIED OUT BY THE LABORATORY 1935 - 36.

Following is a summary of the work carried out by the Laboratory staff during the year.

Table "A" gives the inspection and routine testing undertaken and Table "B" all the other work executed, reports of most of which have been forwarded during the year.

A. Inspection of Raw Materials, intermediate and finished Products, etc. for year ending 31st Match 1936.

#### Raw Materials.

_			
Cotton Waste Glycerine	310	tons	Caustic Soda   10 cwt. Saltpetre 2 tons
Acetone	340	9 9	Gum Arabic 3 cwt.
Mineral Jelly	13	2 2	Diethyldiphenyl-
Nitrate of Soda	966	, ,	urea 30 tons
Soda Ash	16	2 2	C.O.V. 252 ,,
Chemical Lead	102	9 9	N.O.V. 1093 ,,
Calcium Carbonate		cwt.	Nitric Acid 17 ,,
Calcium Cyanamide Ammonium Nitrate		tons	Coke 503 ,
Ammonium Per-	37	, ,	Charcoal 12 cfw.
chlorate	7.4	OTTE C	Petrol 280 galls.
	1	cwts.	Dimethylaniline 30 tons

#### Intermediate Products.

## Finished Products.

742 Samples representing Cordite M.D. - 151 lots
8 batches
Mk.I - 37 lots
36 Samples representing R.D.N./A. - 10 lots
5 batches
38 tons
269 Samples representing Cordite W. - 87 lots
838 tons
Experimental
14 tons.

## Finished Products (Contd.)

259 R.D.N./A. Samples 517 W. Batch Samples 480 W. Blend Samples 269 W. Lot Samples

Fuze Powder - 64 Samples 7,840 lb.

C. E. - 300 Samples 20 tons

R.D. 202 - 144 Samples 1,300 lb.

## Routine Inspection for the purpose of Process Control.

C.O.V. for Nitroglycerine manufacture, Guncotton ,,	119 100 13	Samples
Denitrated Acid for Guncotton manufactor,, N/G. ,,	ture 52 233	) ) ) )
Nitric Acid for N/G manufacture ,, G/C.,, ,, C.E.,,	228 90 11	2 2 3 2 3 2
Mixed Acid for N/G manufacture ,, G/C ,,	19 70	2 2 2 2
Waste Acid for N/G manufacture ,, G/C ,, C.E. ,,	47 43 5	2 2 3 2 3 2
Condensate Acid for G/C manufacture	100	, ,
Nitre Cake from N/G manufacture ,, G/C ,, ,, C.E. ,,	41 16 14	9 9 9 5 9 9
Soda Nitrate from $G/C$ manufacture ,, $N/G$ ,,	13 45	9 9
Cotton Waste	905	y 9
Acetone	649	22 "
Mineral Jelly	50	9 9
Glycerine	50	9 9
Filter Bed Waters	520	, ,
Vat Boiling Waters	3,080	, ,
G/C from stoves and Weighing House	692	9 9
Experimental Acid	10	3 2
Lime Waters	14	9 9
Product "A"	61	9 9
Product "C"	128	3 3
Product "D"	17	9 9
Sludge	33	9 9

#### Routine Inspection (Contd.)

Numerous samples of miscellaneous stores, of which the following are typical, were also inspected:-

Asbestos Powder, Fibre, Packing, etc.

la tons

Machinery Oil, Cylinder Light

960 galls.

Kieselghur

1 ton

Barium Sulphate

Spelter

Paraffin Oil

Non-absorbent Paper

- B. Experimental, Development and other Work carried out by Laboratory Staff during the year ending 31.3.36.
  - Analysis of purified Cotton Waste from Messrs. Spencer & Curedale.
  - 2. Alkalinity of Guncotton from stuff-chest at beginning, middle and end of the run in Batch No. 1741.
  - 3. Examination of dirt collected on the filter muslums during reworking of M.D. Cordite size 16. W.A. Lot 323.
  - 4. Examination of Lanoline Rust Preventer and comparison with other rust-preventers.
  - 5. Fractional Distillationand purification of large sample of crude Toluene from H.M. Fuel Research Station, Greenwich (part).
  - 6. Investigation of the corrosion of metals (copper, aluminium, mild steel and staybrite steel) during evaporation of sulphite effluent from T.N.T. washing house.
  - 7. Investigation of the corrosion of Staybrite F.M.B. and F.D.P. steels by various nitric-sulphuric acid mixtures at room temperature and 100° C.
  - 8. Examination and experimental nitration of two samples of Toluene SN.3526 and SN.3527 from National Benzole Association.
  - 9. Preparation of specification for complete installation of equipment and apparatus for control laboratory of plant manufacturing Trinitrotoluene.
  - 10. On the corrosion of certain samples of stainless steel by various nitric-sulphuric acid mix- \* tures, and of samples of aluminium by concentrated nitric acid.

## B. Experimental Etc. Work (Contd.)

- ll. The corrosion of samples of lead and tellurium lead by nitric-sulphuric acid mixtures at various temperatures.
- 12. Analysis of Solka Alpha NN cellulose from Johnson Jorgensen and Wettre Ltd.
- 13. The corrosion of stainless steel FeCo 80 in various nitric-sulphuric acid mixtures at room temperature and 100° C.
- 14. Investigation of the cresol content of a sample of crude Phenol from the Manchester Corporation Gas Works, and of the separation of the cresols therefrom.
- 15. On the corrosive action of 98% sulphuric acid at ordinary temperatures and at the boiling point upon cast iron.
- 16. Preparation and maintenance of a chart showing the possible output of all available plant in the factory in terms of tons per week of Cordite.
- 17. Correlation of the results of a large number of corrosion tests on metals, especially alloy steels, carried out at R.G.P.F. and at R.N.C.F., Holton Heath.
- 18. On the corrosion of "Tantcopper" by dilute sulphuric acid at room temperature.
- 19. A study of the esterification of monochlore acetic acid by ethyl alcohol with the object of improving the economics of the present manufacturing process.
- 20. An investigation of the relation between the aniline content of crude Monoethylaniline and the setting point of the diethyldiphenylurea prepared from it.
- 21. A comparison of the resistance to corrosion of chemical lead in a number of locations in the factory where lead is used (part).
  - 22. Preparation of designs and drawings for proposed new C.E. nitrating plant.
  - 23. Preliminary experiments on the wet-sieving of C.E.
  - 24. Analysis of metal gauze (nickel) suggested for use in cordite pressing.
  - 25. Test of the resistance of certain blue bricks to the action of boiling acid (part).
  - 26. Preparation of plans for rearrangement of existing C.E. nitration plant.
  - 27. Preparation of sketches to assist co-operation of other departments in various factory constructional works.

## B. Experimental Etc. Work (Contd.)

- 28. Operation, as required, of the Hospital  $X\!-\!Ray$  Installation.
- 29. Examination and experimental nitration of low-grade Trimitrotoluene from T.N.T. Pilot Plant.
- 30. Preparation of specification for Tellurium lead, and examination of methods of its analysis.

NOTE: Items marked thus \* were undertaken for the Supply Board Technical Establishment.

19 WW 3 36

# REPORT OF WORK OF THE GUNCOTTON SECTION FOR THE YEAR 1935 - 1936.

#### ACIDS.

The denitration Tower scheme referred to in last year's report has been shelved for the present, and it has been decided instead to arrange for emergency programme by using No.1 Nitric Acid Factory mainly as a still house and No.2 mainly as a retort house, installing retort pots, however, so that they can be used for either. Work on this is well in hand.

The first aluminium Nitric Acid cooler was recently inspected after some 18 months' running. Slight corrosion of the coil at the "wind and water" line was observed, but otherwise the condition was excellent.

In the Concentrator House the Calder-Fox scrubber has been subject to lengthy tests and has been finally abandoned as it appears impossible, under any running conditions, to produce an exit gas complying with the regulations under the Alkali Act without reducing the output of the plant very greatly. No.9 "Bowden" concentrator has run throughout the year without trouble, and the construction of No.3 has been completed. Repairs to producers are either completed or well in hand.

Nos. 7, 8 and 9 Mixed Acid tanks are being prepared for use. Motors with suitable reducing gear for mechanical stirring are being fitted centfally on top of the tanks and this should prove a much more convenient arrangement than the old belt drive. The foundation has been erected for another waste acid tank.

#### COTTON PREPARATION.

Visits to manufacturers' works to supervise production of our paw material have continued and the greatly decreased quantity of pickings is evidence of the value of this arrangement.

An aluminium guard has been fitted to the feed end of the bale breaking machine to prevent possible accidents due to men slipping when feeding the machine with cotton. All the machines

have been rendered fit for use and new bearings, etc., fitted where necessary. It was found in the course of this work that No.3 drying machine was set to run at about twice the normal speed. This has been corrected. Half-inch wire mesh grids have been placed over the bottoms of the tables on which the cotton falls from the drying machine, and from the brattice immediately before weighing. A surprisingly large amount of grit and small metal rings that would otherwise go forward for nitration is collected beneath these.

#### NITRATION.

During the year all overhead pipe work in No.1 Nitrating House has been coated with a mixture of tar and ozokerite. This appears to give satisfactory protection. The small central earthenware "biscuits" which protect the outlet of the hitrating pans are being replaced by stainless steel perforated plates made by the plumbers, contract prices for these items being excessively high. An aluminium exhaust fan designed and made in the factory has been installed and has run for more than half the year with complete satisfaction. The small Sturtevant stainless steel fan has failed several times, mainly on account of flimsy sonstruction. Old tower sections have been used to construct new exit shafts with improved results both as regards draft on the pans and acid drips in the exit. No.2 House is being prepared for service, and special efforts are being made to ensure satisfactory ventilation. The fume pipes are being enlarged from 5" to 7" and stainless steel exhaust fans are to be used. The waste acid pits are being enlarged to bring them into conformity with those in No.1 House.

#### BOILING.

All vats in No.3 house have now been fitted with tellurium lead kier columns. They seem very successful and so far have shown no tendency to lean over in the way in which ordinary lead columns did. Tellurium lead linings, now fitted to about half the vats in this house, have been much less successful and crack

very readily. The large number of serious leaks that have occurred in this way appear to be mainly responsible for the considerable amount of trouble due to varying alkalinity that has been experienced.

Two vats are now fitted with recording thermometers and it is hoped to complete the installation of these in all vats during the ensuing year. Nearly all the vats in No.1 house have been repaired and rendered suitable for use under non-specification conditions, and work on No.2 house is in hand.

#### PULPING AND MOULDING ROOM.

of the 15 beaters, 14 are now ready for use. Experiments have been carried out on the effect of variations in time of beating and in load on output. A mixture of tallow and is now used for lubricating purposes and it is found that the bearings run considerably cooler than with tallow only. The aluminium trucks in which the Guncotton is brought from the Vat House have been fitted with hinged aluminium flaps at the ends so as to form an apron during the loading of the beaters. This is a distinct improvement on the sail-cloth aprons previously used for this purpose.

pulp has been largely completed. The grit runs, magnets and blanket runs are now laid out in a convenient and accessible manner and with a steady fall. The problem of potchers is now entering upon what, it is hoped, will be the final stages. The method of injecting the pulp tangentially into a circular vessel, referred to in last year's report, proved very successful on a small scale, and after experiments with a model holding 20 lb. of pulp, a 1-ton machine of the type was constructed and is in regular use for Service Guncotton. A second machine of the same size is now erected, and a 2-ton machine is under construction. The method seems to give very thorough washing and blending, and the all-lead construction eliminates metallic contamination. The system is economical in power as compared with

other types.

Phe filling-in of old save-alls, removal of stuff chests and lime tanks, covering of floors and general tidying up of plant in this building have added greatly to working convenience and lessened chances of contamination of the Guncotton. Cotton for service work is now stored in aluminium bins before moulding, and the moulding machines have been moved to more convenient positions. Following on a small explosion in the Plumbers' Shop during the re-gauzing of moulding machine plungers, detachable perforated metal tops, to which the gauzes are soldered, have now been fitted to these machines.

#### SERVICE GUNCOTTON.

Extracts for Service Guncotton were considerably greater than in recent years. No trouble has been experienced with slabs or wet charges, but work on primers was considerably impeded by an explosion which occurred in No.9 press about the end of November. This was apparently due to a fault in the hydraudic system.

Primers are now stamped with the test number after acetoning. This gives a cleaner impression and avoids one handling of the primers in the very fragile state in which they are before acetoning.

#### R.D. COMPOSITION No. 202.

Early in the year it was decided to renovate all the buildings in this section, and a type of construction using "Insulwood"
which has a smoother surface than the "Celotex" previously used,
and avoiding all internal projections, has been evolved which
appears almost ideal for dusty work of this sort. Immediately
after restarting, a new batch of charcoal was brought into use
which gave consistently slow burning times and, in spite of every
effort, it has proved impossible to make material to give fast
times. This has caused considerable difficulty in producing
material that would comply with specification limits to fill
extracts.

# TOTAL PRODUCTIONS

#### -PARTICULARS OF MANUFACTURE.

#### Nitric Acid.

Soda Nitrate Charges

243 at 2 tons

4 at 1 ton

= 490 tons

Total Soda Nitrate charged

548.80 s.tons Crude

= 544.68 ,, Pure

Equivalent HNO3

403.63 ,,

Nitric Acid produced

441.10 ,, at 89.85%

= 396.33 ,, HNO<sub>3</sub>

Loss

7.30 ,,

Efficiency

98.20%

Strong Sulphuric Acid used 533.44 s.tons at 94.43%

= 503.61 ,, H<sub>2</sub>SO<sub>4</sub>

### Redistillation.

Acid charged to Stills - 2,565.75 s.tons containing:-

1559.33 s.tons H2SO4

456.57 ,, HNO3

Strong Nitric Acid recovered

501.30 ,, at 89.03%

446.27 ,, HNO3

Loss

10.30 ,, ,,

97.73%

Weak Sulphuric Acid recovered 1984.28 s.tons at 77.47%

= 1536.93 ,, H<sub>2</sub>SO<sub>4</sub>

Loss

22.40 ,,

Efficiency

Efficiency

98.60%

#### Concentration of Weak Sulphuric Acid.

Acid charged to Concentrator 1949.00 s.tons at 77.35%

= 1507.63 ,,  $H_2SO_4$ 

Strong Sulphuric Acid produced 1575.69 ,, at 94.3%

= 1484.83 ,, H<sub>2</sub>SO<sub>4</sub>

Loss

22.8

Efficiency

98.55%

#### Nitration.

No. of sets of Guncotton	4,818
,, ,, Nitrocotton	33
	4,851
Mixed Acid used	8335.17 s.tons
Cotton Waste used	298.16 ,, gross
	270.23 ,, nett
Guncotton produced	450.21 s.tons
Save-all	10.18 ,,
Yield .	166.6%
Available for Cordite	162.9%
Ratio - Mixed Acid/Cotton Waste	30 : 84
Mixed Acid/Guncotton	18 : 51

# Guncotton etc. Issued to Services other than for Cordite Manufacture.

12,915 1 lb. Slabs to C.O.O. Bramley and Woolwich

1,000 l lb. Charges to C.O.O., Woolwich

14,560 l oz. primers to C.O.O., Bramley

100 lb. Guncotton Pulp to C.S.R.D., Woolwich

100 lb. Nitrocotton Pulp to C.S.R.D., Woolwich

10 lb. Guncotton Pulp to Messrs. Vickers.

Total - 15,035 lb. = 7.5175 s.tons.

#### Materials.

 $\frac{\text{T. c. 1b.}}{\text{Oleum drawn from Store}} = \frac{\text{T. c. 1b.}}{677} = \frac{15.25 \text{ s.tons}}{133.10},$   $\frac{133.10}{625.15},$ 

#### = 1.3885 per lb. of Guncotton.

Nitrate of Soda drawn from Store  $\frac{T. c. lb.}{490 0 0} = 548.80 \text{ s.tons}$ Difference in Stocks 74.82,,

Nitrate of Soda consumed 473.98,,

## = 1.053 per 1b. of Guncotton.

Cotton Waste drawn from Store  $\frac{T \cdot c \cdot 1b \cdot}{266 \cdot 4 \cdot 31} = 298.16 \text{ s.tons}$ Deduct Oil and Moisture (.19% and H<sub>2</sub>O 6.27%) 19.26 ,,

Deduct Pickins and Fly 8.67 ,,

Nett Cotton Waste used for Nitration 270.23 ,,

Foreign Matter removed in picking, etc.:-

Wood, string and metal 697 lb. = .1169% Grit 42 lb. = .007% Fly 1660 lb. = 2.785%

Cotton used per 1b. of Guncotton -

0.6622 Gross

0.6002 Nett.

#### Summary of Consumption of Losses.

	H2S04		HN03		
	Actual	Per ton of G/C.	Actual	Per ton of G/C.	
Manufacture of Nitric) Acid )	503.61	1.119	7.30	.0162	
Redistillation	22.40	.0497	10.30	.0228	
Concentration	22.80	.0506	***	was	
Nitration	112.30	.2470	<b>3</b> 37.88	.7505	
Washing out Plant	2.04	.0045	.38	.0008	
=======================================	<b>66</b> 3.15	1.4708	<b>3</b> 55.86	.7903	

#### ANNUAL REPORT - 1935 - 36.

#### NITROGLYCERINE SECTION.

The manufacture of Nitroglycerine, stoving of Guncotton, and Paste mixing has proceeded during the year without any difficulty being encountered. The yield of Nitroglycerine has increased slightly during the last two years and has reached the figure of 234.5%. This increase is probably largely due to increased rate of manufacture which entails, amongst other factors, a smaller proportion of water used for cleaning plant to Nitroglycerine made.

The erection and fitting up of the Quinan Guncotton Stove is proceeding.

Picrite manufacture has continued satisfactorily. Plant has been operated on a three-shift a day basis during a considerable part of the year, so getting the largest output from the process that has as yet been attempted.

Nitration of C.E. and subsequent purification to Crystal, Ground and Corned C.E. Grade I have been carried out during the year with an increasing rate of manufacture. Manufacture of nitric acid from sodium nitrate and sulphuric acid recovered from the waste agid from nitration, also recommenced.

The number of men employed on the section has been considerably increased. This has entailed some difficulty in training the new men to the required standard of working ability.

# (b) Nitroghy cerine Section

## A. Manufacture of Nitric Acid.

The retorts used were: -

No.10 - 123 runs at 30 cwts. of Nitrate of Soda No.11 - 123 ,, ,,

Average time of distillation - 12 hours.

413.28	s.tons		
280.72	, ,	at	86.7% H2SO4
150.75			20% free S03
46.88			
281.80		at	90.5% HNO3
62.06			60.1% HN03
495.94	, ,		33.0% H2SO4
83.8%			
95.9%			
	280.72 150.75 46.88 281.80 62.06 495.94 83.8%	280.72 ,, 150.75 ,, 46.88 ,, 281.80 ,, 62.06 ,, 495.94 ,,	150.75 ,, at 46.88 ,, at 62.06 ,, at 495.94 ,, at 83.8%

## B. Denitration of Waste Acid.

120 charges of Waste Acid were denitrated in No. 1 Tower.

Waste Acid denitrated 366.00 s.tons (261.94 s.tons H<sub>2</sub>SO<sub>4</sub> (40.18 s.tons HNO<sub>3</sub>

Denitrated Sulphuric)
Acid made 367.51 ,, at 71.2% H<sub>2</sub>SO<sub>4</sub>

Weak Nitric Acid made 60.00 ,, at 57.6% HNO<sub>3</sub>

Efficiency Sulphuric Acid 100%

Nitric Acid 86.0%

#### C. Concentration of Weak Sulphuric Acid.

Concentrators Nos. 2 and 3 were used.

Output.  Weak Acid concentrated Coke used	700.49 50.21	s.tons	at	67.8%	H <sub>2</sub> SO <sub>4</sub>
Strong Acid made Weak Acid made	461.45 107.58	, , , ,	at at	89.3% 45.5%	H <sub>2</sub> SO <sub>4</sub>
Efficiency Strong Acid Total Efficiency	86.7% 97.0%				

## D. Redistillation of Weak Nitric Acid.

50 runs were carried out in No. 4 Still. Average time of distillation was 14 hours.

Weak Nitric Acid used Strong Sulphuric Acid used Coke used	179.55	tons at	59.1% HNO3 92.9% H <sub>2</sub> SO <sub>4</sub>
Strong Nitric Acid made Weak Nitric Acid made Weak Sulph.Acid made	38.57	at , at , at	89.8% HNO <sub>3</sub> 56.3% ,, 72.9% H <sub>2</sub> SO <sub>4</sub>
Efficiency Strong N/Acid Total N/Acid Efficiency Sulphuric Acid Efficiency	68.2% 96.0% 99.5%		

#### E. Acid Mixing.

Output.			
Nitric Acid, new, mixed	214.90 s	.tons at	90.2% HN03
Nitric Acid, redistil-) led, mixed	51.17	,, at	90.2% ,,
Oleum, 20%, mixed	135.75		20% SO3 (free)
Oleum, 65%, mixed	136.50	,, at	65% free S03
Total mixed Acid made	538.32	, ,	

#### F. Manufacture of Nitroglycerine.

120 charges of 1470 lb. glycerine each were nitrated.

Average time of nitration was 70 minutes, and separation 130 minutes.

Average brine temperature was -13°C.

Nitration was carried out in the early part of the year in Nitrator No. 1. Nitrator No. 2 was then used and Nitrator No. 1 completely rebuilt.

Output.		
Glycerine used	88.200	s.tons
Mixed Acid used	495.000	2 2
Soda Ash used	6.720	2 2
Waste Acid made Nitroglycerine made	366.000 206.736	9 9 9 9
Nitroglycerine yield	234.5%	

#### 

## Nitroglycerine - Usage

For	Cordite	M.D.	59.150	s.tons
	, ,	W •	137.566	2 2
	, ,	Mark I	2.997	, ,
		RDN/A	5.720	9 9
For	Dynamit	9	0.780	, ,
For	Sundry 1	Experiments	0.523	2 2

## Summary of Consumption and Losses of Acids.

	H <sub>2</sub> S	504	HNC	3
	Actual s.tons	Per ton	Actual s.tons	Per ton
Manufacture of N/Acid Denitration Redistillation Concentration Acid Mixing Nitration	299.10 1.99 0.72 13.46 13.41 9.73	1.447 0.010 0.003 0.065 0.065 0.047	10.99 6.45 10.61 13.30 176.59	0.053 0.032 0.051 0.064 0.853
	338.41	1.637	217.94	1.053

#### Raw Materials Used (s.tons per ton Nitroglycerine).

Nitrate of Oleum, 20% Oleum, 65% Glycerine	Soda	1.492 0.875 0.632 0.4266
Soda Ash		0.0325

# G. Drying and Weighing Guncotton and Nitrocotton.

Stoves 2 - 13 were used.

174 stovings of Guncotton and 4 stovings of Nitrocotton were dried. The average time of drying was 68 hours.

Total amount dried was:-

Guncotton Nitrocotton 435.000s.tons 5.545 ,,

Guncotton was used as follows:-

Paste, M.D. and W. Mark I

421.141 s.tons

1.883 ,,

Experiments

1.064

Nitrocotton was used as follows:-

Paste, RDN/A Issued to C.S.R.D.

4.010 s.tons

0.200 ,,

#### H. Paste Mixing.

Paste Mixed: -

tons
9 9
9 9
2 2
9 9
9 9

NGA

# I. Manufacture of Man. Tetryl

Manufacture of Nitric Acid. No.17 Retort - 30 runs at la long tons Nitrate of Soda No.18 ,, - 31 2 2 2 2 Average time of distillation - 11 hours. Nitrate of Soda used - 102.48 s.tons at 99.3% NaNO3 23.25 ,, at 20% free SO3 Oleum, 20% used C.O.V. recovered from C.E. Waste Acid also used Strong Nitric Acid made - 63.20 s.tons at 88.1% HNO3 Strong Nitric Acid issued) 56.00 s.tons at 88.1% HNO3 to C.E. Nitration ) Strong Nitric Acid from N.G. manufacture of 49.59 s.tons at 90.4% HNO3

#### Nitration of C.E.

165

269 Nitrations at 96 lb. dimethylaniline each were carried out in Nitrating House No. 4.

Tar Oil used 13.146 s.tons
Nitric Acid used 105.59 ,, at 89.2% HNO3
C.O.V., 96%, used 201.75 ,, at 96% H<sub>2</sub>SO<sub>4</sub>

Waste Acid issued to coppers and then to Nitric Acid manufacture.

Crude C.E. made - 20.200 s.tons (as purified C.E.)

## Purification and Finishing of C.E.

Nitric Acid issued to

C.E. Nitration

Crude C.E. purified 20.710 s.tons (as purified C.E.)

Acetone used 26.76 s.tons
Caustic Soda used 0.55 ,,

Finished C.E. issued as follows:Ground 0.500 s.tons
Crystal 2.800 ,,

#### Other Work.

Corned

(1) Corned C.E. received for grinding 0.650 s.tons Ground C.E. issued 0.636 ,,

5.467

- (2) Crystal C.E. received for repurification) 0.050 s.tons in 1934/35. Acetone used 1935/36 )
  Crystal C.E. issued 1935/36 0.772 ,,
- (3) C.E. received for repurification in 1934/35. Acetone used 1935/36 0.E. Corned and issued 1935/36 7.391 ,,

#### J. Picrite.

Output.

Calcium Cyanamide used Ammonium Nitrate used C.O.V. 98% H<sub>2</sub>SO4., used

57.57 s.tons 21.26 ,, 51.37 ,,

Finished Picrite made

16.917 s.tons

Recovered Sulphuric Acid issued to contractors.

Picrite was used as follows:To C.S.R.D.

0.775 s.tons

To N.A.S.O. and R.N.C.F. 0.250 s.tons To RDN/A Paste Mixing 15.892 ,,

#### K. Manufacture of T.N.T.

N.6.6

T.N.T. manufactured on the "Pilot" continuous nitrating plant was carried out during the first four periods of the year. After gaining further valuable experience in the running of this process, the plant was closed down.

#### Output.

M.N.T. used 15.695 s.tons
Nitric Acid, 98% used 25.865
C.O.V., 96% used 23.340 ,,
Recovered Waste Acid used)
(about 91% H2SO4) 91.405 ,,
Sodium Sulphite crystals)
used 3.898 ,,

T.N.T. (Sulphited and Finished) - 20.914 s.tons.

# Fuze Powder - R.D. Composition No.202.

Manufactured

1,294 lb.

Ammonium Perchlorate (crude) 1,092 lb. (Refined)

## ANNUAL REPORT on the MANUFACTURE of CORDITE

#### 1936 - 36.

#### OUTPUT.

The output of Cerdite from the presses during the year was approximately 662 tons (2,000 lb.), over double last year's production, i.e. an increase of 352 tons.

of this output, 39% was pressed on the small screw presses and 61% on the hydraulics. Last year the percentage was 61% on the small screw and 39% on the hydraulics.

In addition to normal manufacture, 5.3 tons of experimental Cordite was pressed.

The estimated output at the commencement of the financial year was 500 tons, but emergency orders for 123.3 tons were received during the latter part of the year, giving a required output of issued Cordite of 622 tons. The achieved output of issued Cordite was 623 tons.

dates was installed, due to the need for close estimates required for the Pilling Factories, etc. Out of about 91 orders worked upon, only six delivery dates were not kept, two of these being for reasons outside the control of the section. This is considered an exceptionally good performance when the disorganisation of the plans, due to the acceptance of the emergency orders, is considered.

Improved efficiency has been obtained with respect to output per pressing from the hydraulic presses. Last year the output of Cordite W. .057 was about 18.2 lb. per pressing but, through increased control involving periodical weighings of a day's work, this was increased to 21 lb. per pressing, an increase in output of 15%.

marked increase in output of the blending and lottens operations.

The cost of direct labour per pound of Cordite for W. .057 at

the beginning of the year and at the end of the year are as follows:-

	lending	Lotting	Total
Average of Periods	0.38	0.43	0.81
Average of Periods 9 and 10 (latest costs available	0.27	0.23	0.50

or a saving of £1,000 in a year with an output of 800,000 lb.

(i.e. 1936-38) for direct labour alone on this one size. The efficiency for other sizes has also been improved.

#### PERSONNEL AND ACCIDENTS.

The number of men employed has increased from a maximum of 110 last year to 203 at the end of the present year, due to doubling the output. The number of lads on the section has increased from 10 to 17.

The amount of indirect labour, i.e. cleaning and maintenance, was slightly increased, but this increase was more than offset by increase in the efficiency of the direct labour. A certain amount of labour was necessitated by work connected with the general factory repairs under the 240 P. scheme. Since over half the labour was new, having had considerably less than one year's experience, the output was exceptionally satisfactory.

Despite the large proportion of new labour, the accidents to plant, etc., were few. The following accidents were recorded during the year:-

- (1) A tray truck overturned into the plantation and 600 lb. of Cordite had to be reworked and 20 lb. burnt. This accident was due to a faulty condition of the railway track. 9.8.35.
- (2) A tray truck overturned at points East of unloading hood, Black Ditch. 7.6.35.
- (3) Ignition of Cordite dust in cracks of wood capping of the pit of the hydraulic press, Bay 4, Press House No.3, during repair of asphalt surround. 7.8.35.

- (4) Bracket of reeling gear broken, Press No. 144, small screw, Bay 5, Press House No.10. 14.12.35.
- (5) Plunger jammed, press No. 103, small screw, Bay 2, Press House No. 10. 30.10.35.
- (6) Plunger jammed, press No. 150, small screw, Bay 5, Press House No. 10. 11.10.35.
- (7) Plunger of hydraulic press jammed, Bay 2, Fress House No. 2. 10.2.36.
- (8) Plunger of hydraulic press jammed, Bay 2, Press House No. 2. 30.3.36.

Sickness has been normal at about 2%.

#### INSPECTION.

During the year the visual inspection section of C.I.A. was transferred from Woolwich to Waltham Abbey. Blending House No.6 (Building No. 613) was passed to them for use as an Inspection Room. They now mark in the Blending Houses 20% of all cases lotted, and these cases are stored in one of the magazines until required for examination. The labour required for handling of such cases is supplied by the Cordite Section. No appreciable difficulty has been found with this arrangement.

The personnel of the Danger Building Inspection Department has been considerably increased.

#### BUILDINGS.

Considerable progress was made on the 240 P. scheme for the reconditioning of the factory, but there are several buildings and their plant yet to be everhauled.

#### MANUFACTURE.

ouite mormally, except for a period during Merch - April and another during November - December when heavy weights per 100" interfered considerably with production and gave increased waste and irregular cords. Several lots had to be 42 or 43 stranded, and some cords were so heavy that they had to be put into the

rework.

rework. The reason for heavy weights could not be ascertained, but was probably connected with the chemical charactistics of the Cuncotton.

14,040 lb. of rework were incorporated during the year, but difficulty was experienced in pressing. Previous experiments had indicated that 0.0520 - 0.022 dies were required instead of 0.0535 - 0.022 as normally used, but the weight of the resulting cord was very low, and necessitated 46 - 47 stranding when drumning.

15 was decided in future to burn all rework arising from manufacture, and this has been done since the beginning of 1936. Rework Lots 13249.R, 13253.R - 13255.R were satisfactory in proof and were accepted.

W. Cordite. The introduction of 33% solvent for the hydraulics instead of 36, as used last year has resulted in a saving of acetone used. The consumption of acetone this year has been 31.8% for W. Cordite in comparison with 35.5% used last year. The reduction of the quantity of solvent has resulted in much better operating conditions during pressing and packing of the wet Cordite, as the cords are not so sticky.

No reduction of solvent could be made for pressing on the small screw presses, as they would not take the extra pressure required for extrusion.

The addition of 0.2% precipitated chalk at the incorporation stage was commenced on 5.12.35, and no difficulty was experienced from the manufacturing view point.

Difficulty was experienced as usual with caking of the powdered carbamite during storage, and a small pair of preliminary crushing rolls was installed over the feed to the sieving machine, but, although improved processing was obtained, the installation was not a satisfactory solution to the problem.

The proofs redeived during the year were satisfactory and no Cordite was rejected.

Mark I and R.D. N. /A. / Normal manufacture. An improvement

was made to the plant for blank cutting by the installation of a transparent screen over the feeding end of the cutting machine, and also a cover was made for the sievee to reduce the amount of Cordité getting on the floor.

For Service of Research Departmen	Size		Pressed Ib.	Issued
M.D.T. Various	9-2 10-3 10-4 etc. Chopped	))))	156	156
R.D.N./A. various	.042 .040 .020	)	500	500
F.551/27 Various	.045 .023	)	535	535
W.T. and W.Chopped, various	4000		110	110
Modified W. compositions for S.A.A., tubular, chopped, various.	<b>Q</b> IA		76  ***********************************	46
R.G.F.F. Experiments.				
W. Acetone-Alcohol Solvent Trials	Various		25	604
M.D.T. Rework Trials	5-2		600	60
W. Solvent Experiments	.057		360	50 Proof
W. Rework Solvent Trials	.057		540	23
w. Trials with reduced dies	.093		30	ribiqa- sizigiribno-vensio vidi, bralita kitina-
			1,565	TS
Total Experiencental				
	sed.		1347.	

Anthrois

Research Repartment.

1377

1347.

1347.

Army.

Army.

Small Arms Committee.

Ordnance Committee.

15659/16

27399/18

874799/18.

1565

73.

Total 18 727% 14105 3/16

# (c) Cordite

# TABLE I RAW MATERIALS USED.

	e entratement	M.D.	Mark I	RDN/A	Exptl.	Total	
Acetone	293,175	142,157	2,372	8,683	775	447,162	
Min. Jelly	458e	19,256	498	409	400	19,754	
Carbamite	55,404	-	dish	3,901	138	59,443	
Paste	867,725 7	362,235	$9,761\frac{4}{16}$	47,175	$3,834\frac{14}{16}$	$1,290,731\frac{9}{16}$	
Rework	da W	14,040	375	600	1,447 8	1,447 8	15,862 8
	1,216,304 7	537,688	$13,006\frac{4}{16}$	59,759	6,195 <u>6</u>	1,832,953 1	
				447,162			
		Tota	l Incorpor ot includi	1,385,791 16			

# TABLE I.A. - RAW MATERIAL REFERENCE NOS.

Nitroglycerine	Charge Nos.	734	400	857
Guncotton	Batches	1661	400	2105
Nitrocotton	Batches	28	44	33
Picrite	Batches	734	460-	857
Acetone	Consignment Nos.	2425	400	2431
Mineral Jelly	Consignment Nos.	189	siste	192
Carbamite	Consignment Nos.	14	410	23

# TABLE II - MATERIAL INCORPORATED.

The second of th	1b.
M.D. Dough Rework	381,491 14,040
Mark I Dough Rework	10,259 <del>18</del> 375
RDN/A Dough Rework	51,076
W. Dough Rework	923,129,7
Exptl. Dough	$3,972\frac{14}{16}$
Rework	1,447 8
	1,365,79116

## TABLE III / - CORDITE PRESSED.

# A. Small Screw Presses.

£3,	· Omgatt Datan Alabam Tagses	•			
	Small Arms.	M.D.T. 5-2 7-2	376,592 1,290	377,882	
		Merk I, 1/.05 3 20 SC.	3,789 657 5,440	9,886	l l
	Cannon.	RDN/A .029 .034 .042 .052	13,500 3,700 12,372 16,700	46,272 <sub>-8</sub>	387,768
		W060 .046 .040 .036 .016 .154136	576 1,900 12,600 13,330 32,545 18,104	16	
		•	and the contraction of the contr	79,055	
	* *		*	Prija Produktor provincija in diskriptista niko ne indiplocincija sapon	125,327 8
					513,095 <u>8</u>
	Experimental and Proof Samples.	W., W.T. and W.) chopped ) W. modified M.D.T. and M.D.T. chopped M.D.T. Rework H.F. R.D.N./A. F.551/27	2,2026 76 1,4816 600 100 1,670 2,830		
	Less me	taken from normal	8,959 <u>12</u> ) 425		8,53412
					521,63016

#### B. Hydraulic Presses.

Cannon	₩••093 •057	129,925	810,625
Experimental	W. from Straw M.D. Reworked with Carbamit	1,530 23716 e) 200	1,967 <sub>16</sub> 812,592 <sub>16</sub>

# TABLE III - CORDITE PRESSED (Contd.)

				Chief Control (1987) (Trick of Highlight Manual Andre	ACCUSATION OF THE PROPERTY OF THE PERSON NAMED IN	all transition were to the content of the content o
(ii)	-	No agreement of the				
O. Summer	Λ.			11	0 .	
	Small Sc	rew Presses		513,0	95 <u>16</u>	
	Hydrauli	Presses		810,6	325	
				1,323,	720-8	1986
	Experimen	ntal		10,5	0218	
				1,334,2	22211	
				en er	A CONTROL OF THE STATE OF THE S	
	(7) A 70 1		OCT - The 18" side on			Mildlich Hollett in dass- von oder von dasse vield hausdiglicz se
		TE IA - CO	JR DATE	LAUCICL	(To	Inspection)
Small Arms	g o					
M.D.T.	5-2 7-2	358,375 1,290				
		de Confession of the Confessio	359	,665		
Mark ]	3/.05	3,789 <b>657</b>				
	20 S.C.	5,408	٥	,854		
			COMPLETE PROPERTY AND ADDRESS OF THE PERTY	A COLOR OF THE	369,	519
Cannon.						
RDW/A .	029	10,527				
	042 052	11,727 15,951 8				
		4.00	38	$,205\frac{8}{16}$		
W09	3	132,405				
.06		576 600,930				
.04	6	1,900				
.04 .03		12,600 26,475				
.01	.6	39,790				
• 15	4136	23,515	030	7.03		
			O W O	, 191	876,	396 <u>8</u>
				1	, 245,	915 <u>8</u>
						mar CF

60

# TABLE IV - CORDITE ISSUED (Contd.)

1b.

· 610

about, articular una garante del control de la valoriera delle control de la control d	en e	lb.
Errandmandal and Danad Camples	Bt.forward	$1,245,915\frac{8}{16}$
Experimental and Proof Samples.	lb.	
R.D.B. Rework with Carbamite M.D. Rework with Carbamite	145	
M.D., M.D.T. and chopped	5,595 9 <b>88</b> 76	
R.D.N./A.	1,670	
H.P.	100	
F.551/27	2,830	
W., W.T. and chopped	2,500 <u>6</u>	
W. from Straw	237_7	1. g
W. modified	46	12
	Apple Apple on the control of the co	14,105
-	•	1,260,02016

TABLE IV.A. - CORDITE UNDER INSPECTION BY C.I.A. NOT ISSUED BY BARGE AT 31.3.36.

1b. W. .057 19,225 .154-.136 830 20,055

# TABLE Y - PERCENTAGE LOSS, ETC.

	M.D.		Salario Cons		Mark	on other		RDN/A
Paste Used	362,235		$867,725\frac{7}{16}$		$9,761\frac{4}{16}$		47,175	
Min. Jelly or Carbamite added	19,256		55,404		498		3,901	
Steck Rework 31.3.35	9,310		8,100	£14	$34\frac{15}{16}$	a	900	
	dynagonalgen plea onakururan taxvenia 2018/kilb	390,801	apprendiction of the action of the control of the c	931,229	departulation mail transmission restauration in the production of the state of the	10,29416	de la construitable de la regiona que la deservi-	51,976
Cordite Produced	379,363 <u>-6</u>		893,387%		9,886		47,542 <u>8</u>	
Stock Rework 31.3.36	509		24,200		10		3,100	
	Configuração Paris de Presidência de Presidência (Presidência)	379,363 <u>6</u>	despece elegandi ori con con elecificación hapatal	$917,587\frac{6}{16}$	архофрасцій годан наприкана почетніч	9,896	tiple den verter republishen den von verter den tille	50,642 8
Less	٠	11,437 10	,	13,642 1	,	398 <u>3</u>	•	1,333 3
*Percentage Loss	2 <b>.94</b> %		1.	48%	3.7	4/	2.	61%
*Percentage Acetone used	35.14%		31.	77/5	22.3	0,6	17.	<b>00</b> %
**Percentage Min.Jelly or Carbamite used	<b>5.0</b> 3%		6.	<b>00</b> %	4.8	5%	7.	<b>64</b> %

<sup>\*</sup> Calculated on material incorporated, see Table II.

<sup>\*\*</sup> Calculated on dough incorporated.

# VII . SERVICES

## (a) Steam

Tenders have been received for lagging the 3" steam main from Press House No. 5 to No. 3 Incorporating House and also for four boilers at No. 7 Beiler House. Alterations have been made to supply steam from No. 7 Beiler House to the Tray Steves. Further alterations at No. 7 Beiler House are necessary to make way for the proposed coal telpher and the removal of the old forced draught fans is necessary.

See Tour

Considerable progress has been made with the beilers under repair at Ne.s 1 & 9 Beiler Heuses. These are almost completed cave for a few miner parts. The brickwerk unfertunately has suffered more than expected and considerable work has to be done to put the plant in working condition. A new crane beiler has been purchased erected and tested for the coal crane at No. 9 Beiler House. Six of the name re-conditioned beilers at No. 7 Beiler House have been under steam at 100 lbs per square inch pressure and a trial under working conditions is being carried out. The induced draft fan will increase the steaming capacity of these beilers. The installation of Economisers at No.s 1, 7 & 9 Beiler Houses is being deferred until the emergency arises. There are seven beilers at No. 7 Beiler House not re-conditioned and unless another retary convertor is installed to give 1918 capacity, these beilers should be put into working order. See file on this subject.

No. 3 Boiler House which was shut down a few years age has been re-started to supply steam to Edmondsey Engine House only. The increased demand for steam from the N.G. Section necessitated opening up the Boiler House. Steam for process, heating and power for N.G. is still being supplied from No. 5 Beiler House.

A considerable number of boiler tubes have had to be replaced in the boilers at No. 5 Boiler House. Samples of tubes and water before and after treatment have been sent to Messrs. Babcock & Willow for report. A continuous blow down system has been recommeddeds to prevent scaling and mud deposit on tubes which causes overheating and bulging.

The amount of steam and charing produced as compared with the two previous years is as follows:-

Steam. Cost per 1000 lb.

1933 - 34 116,033,000 lbs. 30.09 d.

1934 - 35 /30,3/2,000 34.6/

1935 - 36

# (b) Electricity

The retary converters removed from R.S.A.F. to the G/C Power House have been set to work and have given excellent service for several months. The removal 65 the 3 rd. retary from R.S.A.F. to R.G.P.F. should be arranged as soon as possible. This depends on R.S.A.F. policy. It is recommended that the North Met Electric supply be continued if War Office approval can be obtained. The Belliss & Morcom sets are well in hand and one set completed and tested under working conditions. The repair of the condenser sets is being undertaken by factory labour. The cable from Daisys Island to Edmondsey should be duplicated. All the electrical power at Picrite, Quinan, No.s 1 & 14 G/C Steves, T.N.T. depends on the small overhead line from Daisy Island. Several steam engine drives at C.E. & Picrite should be replaced by meter drives. The re-organisation of electric cables at P & M Room requires attention and the provision of a substation with adequate switching and fusing arrangements necessary.

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

# BUILDING WORKS DEPARTMENT, R.G.P.F. ANNUAL REPORT 1935-36.

#### PROPERTY.

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

1931 1932 1933 1934 1935 £1,537 £1,524 £1,434 £1,241 £998

The expenditure on demestic property has amounted to £532 against an assessed annual value of £1,024. This does not include the special Maintenance expenditure on account of the internal redecoration and installation of new fireplaces at 54 Highbridge Street.

#### M.W.B. SUPPLIES.

The cost of the water consumed for each of the last five years has been:-

1931		1932	1933	1934	1935
£168	ţ	£182	£199	£192	£289

#### LEE CONSERVANCY BOARD.

The Beard has undertaken weed cutting and clearance of shoals in the W.D. portion of the Small River Lee on repayment by the factory.

The flow of water through the factory has fluctuated between a maximum monthly average of 11,583 cu.ft. per min. in December 1935, and a minimum of 1,035 cu.ft. per min. during August 1935. The daily averages over the past five years have been:-

1935	1934	1933	1932	1931
4,976	2,405	2,766	8,675	9,973

#### DEPARTMENTAL WORK.

The following are the more important works carried out during the financial year.

In the Nitroglycerine area the foundations of the new Quinan Stove were carried out departmentally and the main structure erected by contract.

Four Guncetton Stoves have been thoroughly overhauled and repaired, two of which have been almost entirely rebuilt.

A Coke Condenser has been rebuilt, also Nitroglycerine retorts, C.E. Packing House and Clearing Store have been reconditioned.

Various Guncotton Steve traverses have been raised, and repairs to Guncotton buildings and porches have been carried out.

In the Cordite Factory, Nos. 2, 3, 4 and 7 Incorporating Houses have been reconditioned and lined with insulating boarding, and hot water supply carried to the machines.

Nos. 2 and 3 Press Houses have been thoroughly repaired, and repairs and re-roofing, including internal and external painting, have been carried out in Nos. 5 and 6 Blending Houses.

The roof of No. 4 Cordite Magazine has been renewed, and considerable progress made with the renewal of the roof of No. 2 Magazine.

The traverse of No. 1 Magazine has been raised, and general repairs carried out to Cordite Tray Stoves, Stores, Dining and Shifting Rooms, etc.

In the Guncotton Section the brickwork of six retorts and seven Producers in the Guncotton Acid Factory have been rebuilt, including the platforms and coil trays.

The Absorption Tower piers and superstructure have been entirely replaced.

No. 2 Nitrating House has been repainted and reconditioned.

In No. 1 Vat House the flooring has been largely renewed, the vats reconditioned and the building painted internally and thoroughly repaired.

Progress has also been made with the reconditioning of No. 2 Vat House.

A foundation and base has been provided for a new 2-ton Potcher, and a new Waste Acid Tank foundation has been built.

A coke condenser at the Nitric Acid Factory has been rebuilt.

Throughout the factory the paths between buildings and the surrounds to buildings have been repaired and tar paved. Approximately 4,300 sq.yds. of sand carpet was laid by contract.

Dredging has been carried out continuously throughut the year. The Tray Stove cuts and the Black Ditch have been cleared and the cuts in the Nitroglycerine area have been dredged.

In addition to the more important works already enumerated, repairs have been carried out to Shifting Rooms, Dining Rooms and Reeling Houses, Boiler House furnaces, bridges and trolley tracks.

Approximately 3 miles of track have been renewed during the year.

Seven new boats have been supplied by contract during the year, two for the Cordite Section, one for the Nitroglycerine Section, two for B.W.D. and two for the Stores Department.

A programme of Estate clearance has been carried out.

Dangerous trees have been felled and these and an accumulation of fellings removed and the factory area generally has been cleared of undergrowth, rubbish and debris.

## FIRE BRIGADE.

Inspections have been made of all fire appliances during the year, and they have been found in order.

Three calls were received and attended and the fires were extinguished without difficulty, the damage to property being slight.

An additional hydrant has been fixed, bringing the total number available to 85.

Two extra fire squads have been recruited during the year, one in the Guncotton and one in the Cordite Sections, making a total of six fire squads.

Generally throughout the factory fire rules and precautions have been well observed.

B.W. D. 1

# BUILDING WORKS DEPARTMENT, R.G.P.F. ANNUAL REPORT 1935-36.

#### PROPERTY.

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

1931	1932	1933	1934	1935
£1,537	£1,524	£1,434	£1,241	£1145 £ <del>99</del> 5

The expenditure on domestic property has amounted to £532 against an assessed annual value of £1,024. This does not include the special Maintenance expenditure on account of the internal redecoration and installation of new fireplaces at 54 Highbridge Street.

#### M.W.B. SUPPLIES.

The cost of the water consumed for each of the last five years has been:-

1931	1932	1933	1934	1935
£168	£182	£199	£192	£289

#### LEE CONSERVANCY BOARD.

The Board has undertaken weed cutting and clearance of shoals in the W.D. portion of the Small River Lee on repayment by the factory.

The flow of water through the factory has fluctuated between a maximum monthly average of 11,583 cu.ft. per min. in December 1935, and a minimum of 1,035 cu.ft. per min. during August 1935. The daily averages over the past five years have been:

1931	1932	1933	1934	1935
9,973	8,675	2,766	2,405	4,976

#### DEPARTMENTAL WORK.

The following are the more important works carried out during the financial year.

In the Nitroglycerine area the foundations of the new Quinan Steve were carried out departmentally and the main structure erected by contract.

TII - Maintenance

Four Guncotton Stoves have been thoroughly everhauled and repaired, two of which have been almost entirely rebuilt.

A Coke Condenser has been rebuilt, also Nitroglycerine retorts, C.E. Packing House and Clearing Store have been reconditioned.

Various Guncotton Steve traverses have been raised, and repairs to Guncotton buildings and porches have been carried out.

In the Cordite Factory, Nos. 2, 3, 4 and 7 Incorporating Houses have been reconditioned and lined with insulating boarding, and hot water supply carried to the machines.

Nos. 2 and 3 Press Houses have been thoroughly repaired, and repairs and re-roofing, including internal and external painting, have been carried out in Nos. 5 and 6 Blending Houses.

The roof of No. 4 Cordite Magazine has been renewed, and considerable progress made with the renewal of the roof of No. 2 Magazine.

The traverse of No. 1 Magazine has been raised, and general repairs carried out to Cordite Tray Stoves, Stores, Dining and Shifting Rooms, etc.

In the Guncotton Section the brickwork of six retorts and seven Producers in the Guncotton Acid Factory have been rebuilt, including the platforms and coil trays.

The Absorption Tower piers and superstructure have been entirely replaced.

No. 2 Nitrating House has been repainted and reconditioned.

In No. 1 Vat House the flooring has been largely renewed, the vats reconditioned and the building painted internally and thoroughly repaired.

Progress has also been made with the reconditioning of No. 2 Vat House.

A foundation and base has been provided for a new 2-ton Potcher, and a new Waste Acid Tank foundation has been built.

A coke condenser at the Nitric Acid Factory has been rebuilt.



Throughout the factory the paths between buildings and the surrounds to buildings have been repaired and tar paved. Approximately 4,300 sq.yds. of sand carpet was laid by contract.

Dredging has been carried out continuously throughut the year. The Tray Stove cuts and the Black Ditch have been cleared and the cuts in the Nitroglycerine area have been dredged.

In addition to the more important works already enumerated, repairs have been carried out to Shifting Rooms, Dining Rooms and Reeling Houses, Boiler House furnaces, bridges and trolley tracks. Approximately 3 miles of track have been renewed during the year.

Seven new boats have been supplied by contract during the year, two for the Cordite Section, one for the Nitroglycerine Section, two for B.W.D. and two for the Stores Department.

A programme of Estate clearance has been carried out. Dangerous trees have been felled and these and an accumulation of fellings removed and the factory area generally has been cleared of undergrowth, rubbish and debris.

Improvements in the Incorporating Houses has entailed a considerable amount of work in providing scaled entry and exit of steam pipes. All Incorporating Houses except Not/ I have been provided with a het water service and considerable imprevement has been made in lighting and switching facilities.

No. 2 Vat House has been provided with a ring water main of ample capacity although the main of the filter system requires to be considerably enlarged to prevent less of head. The lighting service has been re-wired and steam service prepared.

Stirring gear for No.s 7, 8, 9 & 10 Acid Tanks has been purchased and two tanks fitted up. A new Weak Waste Acid tank with stirring gear is being erected at the G/C and six new reterts have been erected in No. 2 N.A.F., G/C. Beaters have now been put in good order. The service plant has been re-arranged and a new design patcher has been erected and tried out. This has been followed by the 2 Ten petcher and pumps of suitable design and capacity are being purchased from Messrs. Lee, Howl.

The re-conditioning of No. 2 Mitrating House has made progress and a modern lighting installation erected. The acid service pipes have been renewed and water service connections re-made.

A vacuum pump for service moulding machines is necessary for emergency output and is being purchased this year.

G/C Stoves services have been reconditioned and the hot air services of two stoves is being altered to give improved circulation of air. A C.E. Nitrating House has been provided with a complete plant, including electric drive for the main shafting. External lighting for C.E. Purification house has been provided and considerable improvement made in plant. A forced het air drying system for a C.E. Steve has been provided.

The new sieving system for Cerdite cylinders has been extended to all the Small Screw presses of No. 10 Press House and to the cylinders of the hydraulic press houses No.s 2 and 3. Progress is being made with the cylinders of Press House No. 5 but the construction of the cylinders renders necessary the insertion of a screwed bush to receive the recess for the sieving system.

Mantlets for Press Houses 5 and 6 are being erected. Bay 1 No. 10 Press House has been completed by bringing and erecting presses from Quinton Hill.

#### FIRE BRIGADE.

Inspections have been made of all fire appliances during the year, and they have been found in order.

Three calls were received and attended and the fires were extinguished without difficulty, the damage to property being slight.

An additional hydrant has been fixed, bringing the total number available to 85.

Two extra fire aquads have been recruited during the year, one in the Guncotton and one in the Cordite Sections, making a total of six fire squads.

Generally throughout the factory fire rules and precautions have been well observed.

# ROYAL GUNPOWDER FACTORY, WALTHAM ABBEY.

# Cost of Principal Productions for:-

Cordite;-	1935-36	1934-35
	Per 1b.	Per 1b.
N D E O		s. d.
M.D. 5-2	3. 0 <sup>3</sup> / <sub>4</sub>	3. 74
W.8. (W.054 & .057)	$2.10\frac{3}{4}$	3. 4½
R.D.N.a.	5. 1.	6. 0 <sup>3</sup> / <sub>4</sub>
Picrite.	6. 3 <del>3</del>	6. 8.
Composition Exploding, Crystals,		
Grade I.	5. 1.	ess
Composition Exploding, Ground,		
Grade I.	5.112	•
Composition Exploding, Corned,		
Grade I.	6. 2 <sup>1</sup> / <sub>4</sub>	403

## ROYAL GUNPOWDER FACTORY, WALTHAM ABBEY.

# Cost of Principal Productions for:-

Cordite:-	1935-36 Per 15.	1934-35 Per 1b.
	8. d.	s. d.
M.D. 5-2	3. 03	3. 74
W.8. (W.054 & .057)	2.104	3. 42
R. D. N. a.	5. 1.	6. O <sup>3</sup> / <sub>4</sub>
Picrite.	6. 34	6. 8.
Composition Exploding, Crystals, Grade I.	5. 1.	100
Composition Exploding, Ground, Grade I.	5.11½	-
Composition Exploding, Corned, Grade I.	6. 24	-

#### XVI. WAR EMERGENCY ACTIVITIES.

It will be evidenced from the remarks on maintenance that the factory generally is in a very good state of repair.

As a result of a visit to the factory by the Master General of Ordnance and the Director of Ordnance Factories, it has been decided (1) that there is no need in the present outlook to enlarge the Vat House; (2) that in the present outlook Waltham will be maintained to produce 150 tons Cordite W. and 50 tons Cordite M.D.; (3) that, if anything should occur to modify the present proposals for removal, or to delaw action, then the situation must be reviewed.

Also, certain matters on which action has been suspended pending a decision on removal are enumerated below:-

New lay-out for Tetryl Factory
Restoration of 2 Cordite Stoves
Further progress with Quinan Driers
Denitration Towers for spent acid
Automatic Telephone Transpar System
New Machinery Shop

Collaboration with the Supply Board Technical Establishment continued throughout the year.

The action for the emergency supply of electricity at the Lower Works has been concluded as regards two converters.

XII. CONCLUDING REMARKS.

Offendig /

## 1935 - 36.

## ANNUAL TURNOVER.

## ROYAL GUNPOWDER FACTORY, WALTHAM ABBEY.

			and the second s		Control of the second control of the second		anders varieties the global and an extension of the contraction of the	a de la company
						PARLIAMENTAR ESTIMATE. £	erro II	LATEST ORECAST. £
	1	Establishments. Wages.				5,335 101,800	11	5,235 0,535
7	C.	Materials.				77,585		1,425
The same of	D.	Machinery, Contrac	t.			12,285	1	6,480
000000000000000000000000000000000000000		Works, Contract.				4,810		3,785
SILCONIE SIL		Miscellaneous.				6,500		7,630 7,000
20000000000000000000000000000000000000	G.	Non-effective.				8,300	учения рошенция	
in the state of th						216,615	24	2,090
And		Add - Net effect o	f Material	s on I.D.D'	8	2,000		2,900
#1000000000000000000000000000000000000						218,615	24	4,990
SCOTON STATE OF STATE	н.	Productions for Ar	my, Navy,	etc.		213,410	23	7,700
Pagasara Contras III		Miscellaneous Rece	ipts.			2,400	**	2,760
bertales Kopkentres et ett		Sale of Scrap, old issued on repa		nd stores		1,200		1,170
200-12 potential						217,010	24	1,630
		Less - Net effect	of I.D.Sen	vices.		7,210		7,230
A STATE OF THE STA						209,800	23	4,400
		Balance as shew	n below.			8,815	,	0,590
	MENTS ENGINEER MAN	INCOMINGS.	encapper and deviate weeking and determine the service of the serv		capte managagi kemiliki deminingan menanga meningan pelangkan pelangkan pelangkan pelangkan pelangkan pelangka	OUTGOINGS.	MANAGEMENT STATES STATE	THE PROPERTY OF THE PROPERTY O
	reco	ted amounts	Parly Estim-	Latest. Forecast		ated expenditure  ew Capital:-	PATIVA DE STIMO	Latest Forecast.
		spect of:-			10 m d 3 d	lings:-		
		eciation of:-	3,375	3,290		Contract.	550	1,570
		chinery	3,975	3,280	3 /	Departmental	3,700	900
The state of the s		ins.	405	373	, ,	inery:	<b>w</b> g, 00	
	Ti anni A	ten off:-				Contract.	8,285	4,390
		chinery	145	2		Departmental.	3,480	1,900
		ildings.	7.20	160	(6)	The There among acres	09 200	2,000
100		ins	-	-	Mains	CONTRACTOR		
1		nd.	400	845		Contract. Departmental	500 200	525 45
	tac == -	Pan Prom Dismillan	i i					
2.0		fer from Supplies pense Account.	8,815	10,590		& other non-		
	Sus	Spanza Wodomir.	0,010	10,000		reciated assets	400	•
						ease of Stores Stock.	-	9,210
			16,715	18,540			16,715	18,540

### ANNUAL TURNOVER - 1935 - 36.

	Parliamentary Estimate	Latest Forecast
A. Establishments B. Wages C. Materials D. Machinery, Contract E. Works, Contract F. Miscellaneous G. Non-effective		
Add Net effect of Materials on I.D	.D.18	SEPTION TO ALLEGATION CONTROL TO A SECURITION OF THE SECURITIES OF
	The Adaptive of the Control of the Adaptive of the Adapti	activities in various descriptions of the control o
H. Productions for Ar,y Navy, etc.		
Miscellaneous Receipts		
Sale of Scrap, Old Stores, and Stores issued on repayment		MOVE TO ALL ADDRESS CONTROL AND ADDRESS CONTROL AND ADDRESS CONTROL AND ADDRESS CONTROL ADDRES
Less Net effect of I.D. Services	MOSPHer-related done opposite for common statutes	AND CONTRACTOR OF THE PROPERTY
	materials were margin and analysis to prevent across an incident with a first contract and analysis analysis and analysis analysis and analysis analysis analysis and analysis analysis and analysis analysis analysi	statellare entran entransacione entransacion
Balance as shewn below		
	male, var et se en male et en	abatti enati cistaturu nati se zacir case na maga postaban pant ann sa tyralpunt national aben un apoposad
Incomings		Parly. Tatest
Incomings  Estimated amounts Parly. Latest recoverable in Est. F'cast respect of:-	Estimated Expenditureeon new Capital:	Parly. Latest Est. F'cast
Estimated amounts Parly. Latest recoverable in Est. F'cast	ture on new Capital: - Buildings -	
Estimated amounts recoverable in respect of:-  Depreciation of	ture on new Capital:- Buildings - Contract	
Estimated amounts recoverable in respect of:-  Depreciation of Buildings	ture on new Capital: - Buildings -	
Estimated amounts Parly. Latest recoverable in Est. F'cast respect of:-  Depreciation of Buildings Machinery	ture on new Capital:- Buildings - Contract	
Estimated amounts recoverable in respect of:-  Depreciation of Buildings Machinery Mains	ture on new Capital: -  Buildings -  Contract Departmental	
Estimated amounts recoverable in respect of:-  Depreciation of Buildings Machinery Mains  Write Offs -	ture on new Capital: -  Buildings -  Contract Departmental  Machinery -	
Estimated amounts recoverable in respect of:-  Depreciation of Buildings Machinery Mains  Write Offs - Machinery  Decrease of Stores in Stock	ture on new Capital: -  Buildings -  Contract Departmental  Machinery -  Contract	
Estimated amounts recoverable in respect of:-  Depreciation of Buildings Machinery Mains  Write Offs - Machinery  Decrease of Stores in Stock  Transfer from Supplies Suspense	ture on new Capital: -  Buildings -  Contract Departmental  Machinery -  Contract Departmental  Mains -	
Estimated amounts recoverable in respect of:-  Depreciation of Buildings Machinery Mains  Write Offs - Machinery  Decrease of Stores in Stock  Transfer from	ture on new Capital: -  Buildings - Contract Departmental  Machinery - Contract Departmental  Mains - Contract	
Estimated amounts recoverable in respect of:-  Depreciation of Buildings Machinery Mains  Write Offs - Machinery  Decrease of Stores in Stock  Transfer from Supplies Suspense	ture on new Capital: -  Buildings -  Contract Departmental  Machinery -  Contract Departmental  Mains -  Contract Departmental	

apprens !

### R.G.P.F. WALTHAM ARREY.

## FACTORY EXPENSES.

Th	1930-36.	1934-35
Description.	Amount.	Amount.
	E.	
ocess Expenses.		
Foremen, Asst. Foremen etc.	2,863	2,220
Miscellaneous Labour.	1,813	1,134
Consumable Stores.	994	708
Gas.	44	21
Water.	41	21
Steam (Proces).	9,758	6,937
Power.	6,010	4,995
Refrigeration.	4,825	5,749
Compressed Air.	4,542	
Maintenance of Plant.	16,815	3,097
Maintenance of Buildings.		15,589
Depreciation.	2,917	4,461
Rates	1,594	1,394
Internal Transport.	201	192
Balance of Process Expenses.	1,770	990
www.vo or recomme mayounds	2,875	2,537
ctional Expenses.	Or the content of the	
Management.	2,991	2,735
Electric Light.	584	628
ina.	102	74
Steam for heating.	2,616	2,540
faintenance Services.	3,697	2 <sub>3</sub> 065
Miscellan cous Labour.	934	560
Laboratory Testing.	3,089	
Care & Custody of Departmental Stores.	345	5,085
llowances.	4,048	805
o.T. & W.S. Bonus.	450	2,193
Salance of Sectional Expenses.	5,349	190
Credit for Materials returned to store.	598	1,772 _490_
eral Expenses.		
Superintendence.	600	
legistry, Pay & Order Branches.	699 495	546
orktakers, Wages and Accounts.		353
entral Stores.	1,160	829
olice, Fire Brigade and Warders.	3,064	3,010
laintenance of Grounds, Mains, Canal,	4,219	4,205
Permanent Way &c.	1 22 450	
on-effective Charges.	13,451	9,712
alance of General Expenses.	6,436	5,493
	37,285	20,138
Total.	145,858	107,888
esa Subsidy.	14,875	14,873
Total Factory Expense.		
Percentage to Direct Labour.	130,983	93,015
	472,00	64.2.470 Inneriorementariorement automateriorement area anticompany
Direct Labour.	27,698	14,495

### FACTORY EXPENSE.

Description

1935-36 1934-35 Amount

Amount

Process Expenses

Sectional Expenses.

General Expenses

Total

Less Subsidy

Total Factory Expenses Percentage to Direct Labour

Direct Labour.

Appendix. Acethodo Appendix.

Value of Stock Checked

83.400 72,632 61,311 6

£

The surplus of 2 per revealed in stocktaking is equivalent to 38% of the value of stock taken.

for a self best of surplus stores.

Total Amount Realised

This Year Last Year

Nett Loss.

333

£

£

#### Embodied in Report.

Total value of stores held in stock on 31.3.36:-

Manufacturing Materials

£ 63412

Other Items

€ 19 688

Total

£ 83,400

This compares with the value of 31.3.35 as follows:-

Manufacturing Materials

£56,272

Other Items

£16,360

Total

£72,632

# Appendix. III

### MATERIALS.

Price per ton of  $M_a$ in Items (Average Prices given if more than one contract).

Material	1934-35 1935-36	
Acetone	£ 58 8 0	
Cotton Waste	56 14 0	
Glycerine	50 0 0 56 10 - 0	
Mineral Jelly	10 7 6	
Sodium Nitrate	7 15 0 7-15-0	- mile
Ammonium Nitrate	* 17 18 6 (2	TA
Carbamite	P235 2 1 228 - 19 - 10	)
Sodium Sulphite	9 2 6 -	
Calcium Cyanamide	9 0 0 9 - 0 - 0	
Mono-nitrotoluene	45 0 0	
Acid Sulphuric - 20%	6 1 0 5-16-0	
65%	6 1 0 5-16-0	
98%	6 1 0 5-16-0	
96%	5 19 9	
Acid Nitric 98%	19 10 0	
Lead Chemical - Sheet	16 16 8	
Pipe	15 10 6	
Coal, Mechanical Stoker	1 0 10= 1-0-13 16	)

\*Supply from Army Stocks

Supply arranged by Director of Navy Contracts.

Muster of State of St

# APPENDIXTY

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

# Employees on 1-4-35 and 313-36.

Age.	Nos. on 1-4-35.	Nos. on 31-3-36.
65	400	-
64	4	4
63	8	11
62	12	12
61	11	11
60	12	13
59	13	15
58	14	12
57	11	. 26
56	26	10
55	9	14
54	14	11
53	9	21
52	18	14
51	13	11
50	7	7
49	6	13
48	7	12
47	6	11
46	13	15
45	10	12
44	10	20
43	7	12
42	8	13
41	8	10
40	6	21
39	14	15
38	13	16
37	8	16

Age.	Nos. on 1-4-35	Nos. on 31-3-36.
36	8	17
35	8	23
34	9	24
33	11	26
32	11	29
31	13	19
30	12	36
29	14	30
28	14	22
27	10	35
26	14	29
25	15	24
24	7	22
23	11	31
22	11	21
21	4	22
20	4	9
19	5	3
18	2	7
17	3	5
16	3	3
15	1	3
14	1	1
	#COST ADD THE COST AND THE COST	
	488	819
	HARTING TO THE PARTY OF THE PAR	esternosconarios con como de como como como como como como como com

Average age = 42.46

Average age = 37.86

# APPRNDIXV

## R.G.P.F.

## Total strength on 31/3/36.

					Nos.	%
60 a	and c	ver			51	6.23
Ove	r 50	and	under	60.	141	17.22
89	40	W	98	50	139	16.97
90	30	94	98	40	221	<b>26.9</b> 8
50	21	89	99	30.	236	28.82
Unde	er 21	•			51	<b>3.7</b> 8
					819	100 o

#### R. G. P. F.

Personnel.

31-3-36.

Glussomer (Clare to the Control of Control o	Total this year.	Total last year.	HERoudination - HMISSIA +
Supervisory &c.	63	49	observation consists -
Skilled.	121	66	
Semi-Skilled.	142	79	
Unskilled.	469	279	
Women & Girls.	1	-	
Boys.	23	15	
		CONTROL SECURITY CONTROL CONTR	
	819	488	rigo-exploracy destributes
Highest.	828	488	
Lowest.	488	398	
Average.	689	441	
Entries during the year.	392	133	
_			
Discharges " "	67	63	
Transfers " " "	30	23	
	(Transfers "in" - 18 "Out" - 12)	(Transfers "in" - 13 "Out" - 10 )	
			ergionection states have globally an

#### Departmental Memo. No.

Minutes to be numbered consecutively.

Sheet No.

Herewich notes and data arranged

for Annual Report, as far as is possible
at present. In their information is

required before the following Sections can be

completed:

The Maintenant of Experience of the required

The Cost and thus of electricity and skans.

\* XI. - Cost of production.

\* XI. - Stores.

\* XII. - Superial Reserve storks.

\* XIII. - Several Wages questions.

Appendix 1. Annual Turnover

\*\*Toppendix 2. Hartory Expenses.

\*\*Appendix 3. Materials, Stocktaking and Sale of Surplus stores.

In sections makes there- the we have as yet no information whatever and the whole sections remain to be done.

Section XVI - War Emergency Retirities is not complete. I have put in M. 6.0.'s decisions as requested by Supt., but nothing more.

Section XVII - Concluding Remarks - I have left this,

26.6.36.

acon Portara staff he sally effected the efficien Missect . Whiteher lesial oction have been produced the have not been up & time table The buggle, auticl which was ilstroauced this year proved from the burgeted qualit of Chaile was for desid Hortenhadytter cochadure. + this really was andoubled helped he the broanching for datisties thoughout the lav.

the Sembolder orage bris. All was ale fall with an official the Cours for assed of technical kunstege sofmas Ryot for account a won In blagen, a fretes da voral and was duly effor Loke Policy Com bes undownstade

whatevehoù / shall be enowed under for the next few weeks. Under emergency measures X 1906 decisions as recordes c'Val House' Should be inserted.

You Mely

1. R. will por wit & for melunoi

## I. GENERAL SURVEY.

# (a) MANUFACTURE

- (i) Acids sections
- (ii) Guncotton
- (iii) Cordate
- (ir) licité aus ROMA.
- (V) Telay
- (Vi) amposition R.D. 202
- (Vii) Guupnodes
- (viii) Main Laboratory.
- 1x Continuos impection of contile during manufacture

(理整

# b SELVICES

- (i) Hydraulies
- (ii) Compressed are plant
- (iii) Refrigeration plant
- (iv) Air Heating (bureotton stores)
- (V) Telephones
- (Vi) Transport
- (Ni) Mederiery Shop
- (viii) M. U.B. Suppleas
- (IX) Lea Consurancy Catcherent Brand
- (x) Fire brigade
- (XI) Estate
- ( PROPERTY

# TOTAL PRODUCTIONS (N GUNCOTTON SECTION Manufacture of Nitrie Mid Redistillation Comenhation of weak Hisos. Nitration haw Materials issued to service other than for cordit manufacting Summary femoumption + losses of acids. (M MIND STYCERINE SECTION Manuf. of Mitric Acid. Denitration of warte acid. Quentration of weak 4284. Relistibilition of weak AMB3 Manuf I mitroghycerine Drying + Iweighein quieston and nitrocotton (8) Mixing paste. (c) CORDITE how materials Makrial incorporated Cordite pressed Godite issued kreentage Loss etc. (3) (4) TETRYL Reprintedition ICE to constat CE. Reprintedition ICE to corned CE. Many of new CE. PICRITE (e) T.N.T COMPOSITION R.D. 2002 I MATA PROPUCTIONS Summary TV NEW METHODS

and a	URGENT O LIERS		
亚	EXPERIMENTAL OLDERS		
VII	SERVCES.		
	**Alta aurora con a contra co		
	(a) Steam		
	Open and the state of the state	and the second s	
	(b) Electricity		
	description of the second seco		the state of the s
tw	MANNTENANCE		
	participation of control with the control of the co	The second secon	
			The state of the s
TX	COST OF PRODUCTIONS		
1			
	FACTORY EXPENSE		
grander and a second second and a second			
	STORES		
	mention reactions and the market of the mark		
	IMPERIAL RESERVE STOCKS		
	Office and was an experience of the second and the		
	DENERAL WHOES QUESTIONS		
	A material and materials and m	the second secon	
	AGES OF EMPLOYEES		
	at transcendent and an artist and a state of the state of		
	ESTABLISHMENT		The state of the s
-		The second secon	The state of the s
	(a) Strength (b) Strength (c) Personnel		
	(b) Strengti		
	(9 Peronel	The second secon	
main and facilities are	WAR EMERGENCY ACTIVITIES	The second secon	
	,		
	E CONCLUDING REMARKS		
	Nation Control of the		
		CONTRACT TO STATE OF CONTRACT AND CONTRACT CONTR	
		The state of the s	The second section of the sect
	Comments of the Comments of th		
	APPENDIX 1	The state of the s	
		The second secon	All a control of the
	ANNUALTURNOYER		
	APPENDIX II		
	A STATE OF THE STA	1934-36	1934-35
	G. As acc	1935-36 Amount.	1934 - 35 Amount
	ren Expenses timol Expenses eal Expenses		
	und befores		
	ear topleuses	The second secon	
		The state of the s	

1934-35. 1935-86.

STOCKTAKING.

SALE OF SURPLUS STOCKS

A XIONEROH

Age. Mrs. on 1.4.35. 1 Mrs. on 31.3.86.

de

MENDIXI

The Strength on 31. 3. 36

ADDENON OT

Personnel 31.2.25.

This pear.

lat lear

# ANNUAL REPORT

#### SUPERINTENDENT, ROYAL GUNPOWDER PACTORY.

In the year 1935-36.

#### 1. GENELAL SULVEY

## (a) Manufacture

tuning the latter part of the year in landition to the letterated output of 500 tons at the beginning of the year brought the required output of usiness condite to 62% tons. The achieved output was 623 tons.

the year was approximately 662 tons, his increase of 352 tons over last years production; i.e. here than Harble last year's figure.

of saprin ental cordice were produced. The annual thronores is shown in Appendix 1.

hamparting artisties of the factory:

## (i) Acids Lections

hathe Alibro glycerice Acids Sertions manufacture of intin acid from sodium mithale and methodic acid from the spent acid of peritration has recommenced.

Tower Scheme repersed to he last year's report has been shelved for the present, and it has been decided instead to arrange for smergeney propromise by using No.1. Nitric Arid Factory mainly as a Stell House and No.2 mainly as a Ketost House. The retoit- bots installed will, however, he available for fither purpose.

The first Aluminium Notice Acid woles was recently simpertia after some lighteen brouths running. Slight Corrosion of the toil at the Variand and water line" and observed but otherwise the condition was excellent.

In the Concentrator House, the Calder for Sembles, also mentioned in last peais seport, has been subjected to length, tests but has been finally abandoned as it appears impossible under any running Conditions, to produce an skit gas which complies with the segulations of the Alkali tet without reducing the output of the plant very considerably.

Mo. 9 Bowden' Concentrator has own throughout the year without trouble, and the construction of No. 3 has been completed: Repairs to produces are either completed or well in hand.

(ii) UnusHon

words to supervise the production of otto wester sand material have continued and the feath, decreased quantity of pickings in the cotton is evidence of the rather of this ananycement.

in the Miliat my House the shall central earthenware "biseries" which footest the outlet of the mitrating pans are being replaced by stainless. They perforates plates made in the factory. In aluminium exhaust fan Aliigaed and made in the factory has been instaked and has run for more than harp the year hith Complete Jahisfartion.

M. 2 Nitrating House is being pepared for service and the special exports are being hade to susure sakes factory rentilation of by the use of enlarged frame pipes and stainless-steel exhaust forms, while the waste-and pits are being inlarged to bring them had compountly with those in M. 1 source.

All the rate in M. 3 that house have how been fixed wish tellurium lead Kies - which seem very satisfactory, showing your lendency to lear over as the ordinary lead when a did.

Larring the year a considerable amount of thouse has been smountered swing to barying alkalinity in the purcotton mainly this is considered to have been caused, by leaks in those rate which have been fined with tellurium lead. This material is formed to crack very readily when used for rat living.

Themometers and it is hoped to these in all vats during the ensuing year. Meanly all the vats in Mo. 1 House have been repaired and rendered suit able for use anders non-specification Conditions, and work on Mo. 2 House is in hand.

koom repersed to the like offers report has proceeded. The grit-runs magnets and blanker runs are now laid out in a convenient and accessible manuel with a steady fall, while the filling-in of the save-alls removal of strip-chests and lime tanks, covering of floors and general jurprovement in the plant lay out in this brilding have added feaths to working convenience and lessence chances of Contamination of the survey town.

The deseropment of the new type of potities is entering apon what it is hoped! will be the final stapes. The method of injecting the pulp tangentially who a cit cular send describes in lat year's report, proved try murenput on the small scale and after toperiments with a model holding 20th, if prep, a/2 tion markine of this type was constructed and is in regular one por device buncation. A second markine of the same size is how breaked and a 2-ton markine is under construction. The weeker seem to fine run through washing and blending and the all-lead construction chiminally we special is horrowical in prover as companied with the types.

feater than in resent years. No tracks has been

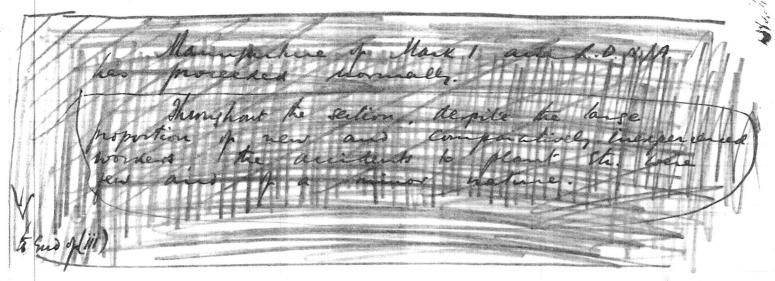
Experienced with slats or lost changes, but work on primers was seriously impeded by an Explosion which occurred in No.9 press about the Sub of November This was apparently due to a fanet in the hydraulic Cystems.

#### (iii) Cordite

The manufacture of M.D.T. Cordite has
proceeded quite normally treeper for a period
during March and ajoil and another
during November and December when heavy
beights per 100" interfered considerally with
production Giving inequelar cordinand
linecased waste. The reason for abnormal
weights comed not be ascertained but was
prototory connected with the physical and
chemical characteristics of the function.

all rework arising from manufacture, and this has been done since the beginning of 1936.

The introduction of 33% solvent instead of 36% for W Cordite has remeted in a lawing of aretone the communation having been reduced from 35.5% for Cast year 66 31.8%. This reduction of the grants, tothing conditions during freezing and packing of the wet Cordite, do the Cords are hot. So sticky. No reduction of solvent comes, however be made for pressing in the small screw presses because they writed not take the catra pressure begined for entrusion. I have addition of 0.2% presipitates chalk at the incorporation stage was commenced on 5.12.33° and no distinctly was specienced in manufacture. The provis serviced during the year here satts factory and no Cordite has been settled.



In improved system of planning and forecarting delivery dates has been installed to meet the need for close estimates leguised for the filling factories the anothers has resulted in exceptionally food adherence to delivery dates in the face of the disorganisation caused by acceptance of emergence, orders.

Experiences of pressing in the Lydraulic presses has their improved by increased control. Law year the output of tordite W. . 057 was about 18.2 lb. per pressing. This has been increased by 15%, to 21 lb. fee prening.

Improved supervision at the Lower books has resulted in a marked incease in output of the blending and lotting operations.

Throughout the sention, despite the large proportion of new and composatively inexperienced workers, the accidents to plant etc. were few and of a minor mature.

## (iv) Piente and R.D.N./A.

her proceeded satisfactorily.

The Printe plant has been spenated three ships a dary during a considerable part of the year, arbieving during that time the layest output from the process that has yet been attempted.

During 1934-35, production of P. D. N./A. Cordite was carried on at a steady rate of one to two week's - work per period, but during the spai 1935-36, output has been Confined to the latter half of the year. Rate of production has, however, been raised from about 1600 lbs. per week in 1934-35 to about 3000 lbs. per week in 1935-36, while total output for these too years was 14 tons and 19 tons respectively.

Owing to increased output, the procedure for preming Cornile RDN. /A. andaid down by C.S.R.D. has proved unsatis factory and certain modifications have had to be made in assaboration with C.S.R.D.

One lot of R.D.N.A. 042/29" was rejected for excessive variations in composition as found try C.I.A. This matter is being investigated by C.S.R.D., and R.G.P.F., as the meterial was found satisfactory when Examined At R.G.P.F. par at the time of issue.

#### (V) Tetry

Reprispiration of material made during the war was suspended in order to commence nitration of fresh C.E.

Nitration and subsequent purification to corpstal, ground and corned et. Grade I has been carried out during the year with an increasing rate of manufacture.

work has proceeded with a view to modernising and increasing the capacity of the CE. factory in this connexion, installation of the second large nitrolor of 300 gals. capacity has been almost completed and the capacity of the CE. profication house has been doubted.

### (Vi) Composition R.D. 202

henovate all the building, in this section and a type of construction using "Insulwood" which has a smoother surface than the "Celoter" previously used, and avoiding all internal projections has been evolved which appears almost ideal for dusty work of this soft.

Inmediately after restating, a new botch of charcoal was brought into use which gave consistently low burning times and, in spile of long effort it has proved impossible to make material to give fast rates of burning. This has caused considerable difficulty in producing material complying with the specification to fulfil extracts. The matter is under further investigation.

8

( Vii) Churgowdes

has consisted Entirely of the production of Milleake for the hearnfathure of Inze Powder S.R. 224, the Millcake being transferred to C.S.O.F. for finishing.

The available plant is only suitable for very small outputs, for larger quantities the restallation of a more efficient saw for cutting the dogwood, mechanical sieves for both wood and charval, and a knove suitable mill for frinding charrons are desirable.

The chantal burner has worked truly successfully and all balches of charcoal have been burnet to specification for carbon contents the total quantity of sharval burnet was 1348 lb.

( with Excellent uniformity)

### (Viii) Main Laboratory.

increased during this year by the rising output of the factory.

The total number of vontine samples analysed in Connexion with the suspection of raw materials, intermediates and prinched products was approximable, 12,000 as compared with about 5,000 during 1934-35.

the field of Experimental and research work has also been greatly increased both in amount and in Scope and an unionally large musted in problems connected with the development of Mant processes and the Ceneral running of the factory.

Notable lines of investigation have been connected with the resistance to convosion of many materials of construction of plant for acids and explosives manufacture her mestures for the sieving and washing of ct., and the alkalinity of burnotton during processing.

(a).

rearrangement of existing CE nitration plant and the proposed new CE. nitration plant was designed.

A considerable amount of experimental and research work was undertaken for the Supply board Technical Establishment 'unduding several investigations on raw materials for T. H. T. manufacture, an investigation of the commercial processes for carbanite manufacture, and an story of the experimental study of the broken aspects of the present manufacturing frocess for chlorasetic ester

(1x) Entiruou Inspection of Cordite during Manufacting
Accommodation the provides for representatives
I the Chief Inspector of Armaments who were posted in the
I factory on the recommendation of the Ordinance Committee.

## (x) Langer Smilding bespectorale

Justin of Langer Similarings is how serident the triest supervision of a perident turpector, to whom Danger Suiding visitors are directly responsible.

This system has ember

Juspertor of Danger Directing armined dely to the Service Impertor of Danger Briedings traitors twere responsible to the Service Impertor of Danger Buildings Ruyal Arenal, howtwich!

Wer sens hunch more patifactory and efficient co-ordination of the Imperting Staff.

lide regards from the samper Smieding Suspertions Shap wirtens of perhaps having to wait for the portugally vinit of an start offices from howlinds.

(b) Services

(1) Azdranlies.

antrines to five sat service. A purter 50 HP.

from to be provided west year to replace from the start from the same pumps the being to the fitter the same one of the same of

(ii) Compress Air Mant

to the oil supply to the air-compressors and
this has been considerate, reduced by
liting a force oil feed pump to the tompressor.
The famount of oil can be regulated very
accurately and the oil has been changed
from light oil to a heavy cylinder oil.
It is thought that this will lead to
a cleaner air supply.

(iii) Representan Mans:

a crew consenses for me of the represention at Edmondsey has been taken up for this year (1926-27).

(N) this Heating (Gunnother Store)

lyc store services have been lunditivied forms the hot air services I too services stores is being allered to fire improced circulation yair.

## (V) Telephones

Cleaning of trees etc. in the vicinity of telephone wires has reduced the number of breakdowns in the service.

To further art in has been taken concerning the installation of an Antomatic Telephone system.

(11) Dransport.

Four y the original accommentors purplied with the tractors have been finally disconded. Hand have been splaced by Niekel- from batteries, god the having a

replace four of those originally supplied with the tractors. The capacity of the new batteries is 50% frecter. We new Gundton lovey purhased last year for bransport of gundton from Quinton Hill to Edmondey Continues to give satisfactory service.

(M) Marhinery Shop

deal with hydraulic press cylinders and to limited heavy work.

(YIII) Mehgerlitan hater Sens Supplie The coro finale.
Commed during The last fire reaso her been;

1931 1932 1933 1934 1955. £168 £182 £199 £192 £289. (1x) La Conservancy Board

The board has undertaken weed cutting and clearance of shoals in the W.D. portion of the Thrace hives Lea on repayment by the spatory.

The flow of water through the factory has burknowled between a minimum hunting hugust of 155° and a maximum of 11,583 cm. fr. Junio Serember 1925°.

The saily area over the last.

The saily area over the last.

The saily area over the last.

1931 1932 1933 1934 1935° 4,976.

(X) Fire Brigade Impersions have been and of all fire appliance during the feel feel of the stand his they have been tall observed throughout the factory. There calls were received thus the themase to property being shight.

The adaptioned by the solution of the factor one in the sure of the sure of the solution of the sure one in the sureston serion and one in the sureston one in the sureston serion one in the sureston one in the sureston serion and one in the sureston.

(XI) Eslace

dearance has been carried on through the year.

Jear. I humber of trees were underdenned the trees tree felled.

There trees and a number of their which had fallen or here been felled on

he partons were lemoned.

The partons area fermally her heer deared of undergrowth etc., and grans has been kept under combot.

(c) Property

The from setume from all property
attended to the factory for the last five year
are as follows:

1931 1932 .1933 1934 1935

£1,534 £1,524 £1,434 £1,241 £1,145.

her amounted to \$532 against his arrenes amount value of \$1,024. The does hold include the special Maintenance lapenaithme on amount of the internal pederoration and installation of heef.

## III Main productions

## January.

Cordite W.

M.D.

188.9.

R.D. N./A.

23.1

Mark. 1.

4.9

Experimental 5-3 667.0 Com-

Composition LO. Loz

647

Tetryl New Manifestores

Reprised 20.710

From Eyste 2.8

New Manifestore 5.467.

## New Medicas IV NEW METHODS

(b) blank cutting the provision of the teamparent server over the feeding end of the tenting heartine and by the provision of a cover for the sieves which palls on the floor.

## (a) Solvent Reduction

A leduntion in the amount of alatone used in the importation of Cordite W has been made where the cordite is to be presed in the hydraulic preses, with ladvantage our remets. This is described under section (a) (iii) of this General

(c) New system of Churcotton Potching

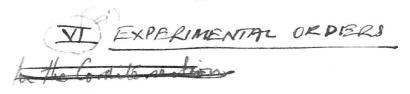
Severie function is requestly being porened in the new type of potiles which was devised at RG. P.F. This his type of markine possesses several waste advantages over the older type and parkinear of its present and proposed lappinations lare given in section (a) (ii) of this General Lurry

(d) Treatment of carbanité before sieving

rolls has been installed over the feed to the sieving markine in order to deal wish carbanite which becomes caked during storage. This caking has caused considerable insomemmence in the part and although the present his hall at con is but an Enterely satisfactory solution to the problem, it has led to improved processing.

## V URGENT ORDERS

Suring the year 1/2 long of endite were from Precently orders, 89.6 long of Cordite W. 057 were mainfaitines for the Army 5 long of R.D. N. /A for the Navy and 27.8 long of M.D. T. 5-2 for the Air Ministry.



been carried out during the year, a summary of the quantities of each type of Cordite is appended.

#### Experimental Batches 1934 - 35.

	Marian Marian Marian	mental bat	CHOS L		-
For	M.D. Reworked with car	bamite .	057	Pressed 16. 200	15. 5,595
	R.D.B. Reworked with o W. from straw cellulos H.F. W. various	.15	8 11 045 4136 4046	1	145 237 <b>7</b> 16 100
			8056 072 112 180	) )	1,677
	R.D.N./A. F.551/27 verious		040 023 045	250 275	250 275
				2,739716	8,279716
For	Service of Smell Arms	Committee.			
	M.D.T.		3-2 ) 3-2 ) 3-2	500 65 <sup>6</sup> /16	500 65 <sup>6</sup> /16
Day	Service of Army.			565 <sup>6</sup> / <sub>26</sub>	565 % 16
E W.L.	W.T. M.D.T. R.D.N./A. F.551/27	5	1048 1-2 1-2 1034 1023	925 825/16 920 2,020	575 <b>325</b> 7 <sub>16</sub> 920 2,020
			***	4,690916	3,8406/16

1717 Short note on the Experimental work. after conflictor of order receives for st. 7 87 de fla i was skort down Darig ale gent e bolig y . 20.9140 lons was man factory Further orlandle experience was gained reford a the work; of the TAT Polot flows.

#### IX. COST OF PRODUCTIONS.

I See Offendix gory costs while can be week Put all the fynisis

A. FACTORY EXPENSE.

Il the FE as ohn - Afferding IT Pass revealed over last years totally come £ 38 oro. Il well to the wellbooks nontenere programme ou fort to mereneed in strength The prestage FF to direct below has falle from 642% 6473%

Total

£83,400

This compares with the value of 31.3.35 as follows:-

Manufacturing Materials £56,272

Other Items

£16,360

Total

£72,632

Appendix III shows comparative prices paid for various items as between 1934-35 and 1935-36, also the result of Stocktaking and the sale of surplus stores.

MC. I think all the information you require is now enclosed. I have given a list of Prod Coals from hely on can relect there ry " The costs of 1934-5 new show are final cooks who not telly exacely will the a lest years report alich were "expected

WIT IMPERIAL RESERVE STOCKS.

The stock of glycomic et the end of the year amounted to some 510 times of which 450 times represented Infance Reserve

Away the year the remany fortim of the Morris Monoral was restored to Endustrial employees of the full consolutation of live Serves 13 cms was for Mrs. Substrails was correct.

The numbers and average ages of employees on 1st April 1935 and 31st March 1936 are given in Appendix IV.

XV. ESTABLISHMENT.

(a) Stoff 24 - Col B g. F. Dandon 380 was afformed

2 spectr of Danger Buildings (29/6/35)

Who & Moggo was afformed Ranger of Bridger

Mucho Dople (Init) wei TV T. W worthers.

(b) Stought the tell structed of the forting on 31 thank (936 is

Shown a White IV. despendie V slows the age gradular at that

date as impart with the end of the previous glass. 91 is satisfacting

to record that the average age has faller from 42.46 to 37.86

Appears VI gards a delaid of previous on the 31 thank (936 1936 repetiely)

## XYI WAR EMERGENCY ACTIVITIES

the Marter General of Ordinance and the Director of Ordinance Factories, it has been decided

outlook to enlarge the vat house.

(2) In the present outlook, tracham will be maintained to produce 150 tons Cordite W and 50 lons Cordite MD.

the present proposals for removal or to delay action, then the situation must be reviewed.

undin of the who he factory genously

also beden maller or which notion has been or removed on sommerching

Werky out for Tilight tratory

Derlow his of 2 touch there

Twiter people with anna Drive

Land to of Town for Spent and

anton oh Teleplone exchange.

t. 666 of the west of Supply Books Technics t. 666 of the se time when I set the year. We reder you the Lifty of whething is the

True has been excluded, es regardo 2 convolis.

effect V

#### Nos. and Average of R.G.P.F. Employees on 1-4-35 and 313-36.

SI	set 1
	- Andrews - Andr

Age	Nos. on 1-4-35.	Nos. on 31-3-36.
65	•	
64	4	. 4
63	8	11
62	12	12
61	11	11
60	12	13
59	13	15
58	14	12
57	11	26
56	26	10
55	9	14
54	14	11
53	9	21
52	18	14
51	13	11
50	7	7
49	6	13
48	7	12
47	6	11
46	13	15
45	10	12
44	10	20
43	7	12
42	8	13
41	8	10
40	6	21
59	14	15
38	13	16
37	8	16

Offendex V Shel- 2

Amn	-		Caret C
A CONTROL OF THE PROPERTY AND	Nos. on 1-4-35	Nos. on 31-3-36.	Arginormonic Administrações de conferencia de confe
36	8	17	
35	8	23	
34	9	24	
33	11	26	
32	11	29	
31	13	19	
30	12	36	
29	14	30	
28	14	22	
27	10 .	35	
26	14	29	
25	15	24	
24	7	22	
23	11	31	
22	11	21	
21	4	22	
20	4	9	
19	5	3	
18	2	7	
17	3	5	
16	3	S	
15	1	3	
14	1	1	
	4005-COnside redesignations		
	488	81.9	
	#EXECUTION OF THE PROPERTY OF	entrational activities and major appropriate and activities activities activities and activities activ	

Average age : 42.46

Average age = 37.86

affendix IV

#### R.G.P.P.

#### Total strength on 31/3/36.

					Nos.	%
80 a	and o	over			51	6.23
Over	r 50	and	under	60.	141	17.22
*	40	10)	99	50.	. 139	16.97
66	30	w	88	40	221	26.98
40	21	聯	\$P	50.	236	25.62
Unde	r 21				31	3.78
					4040MAGS/MgS/Hgtsqs	with the deplacement of the second of the se
					819	100 •

#### R.G.P.F.

Offens VI

#### Personnel.

#### 31-3-36.

		Total this year.	Total last year.
	Supervisory &c.	63	And the second s
	Skilled.	121	66
ı	Semi-Skilled.	142	79
	Unskilled.	469	279
	Women & Girls.	1	40
	Водв.	23	15
N-464 Floor Malary of States Malary (Malary Malary No. 1970) - Hendel		81.9	emperatural contractiva de la contractiva del la contractiva del la contractiva de la contractiva de la contractiva del la c
	Highest.	828	488
	Lowest.	468	398
	Average.	689	441
	Entries during the year.	\$92	133
	Discharges * * *	67	63
	Transfers " " "	30	23
		(Transfers "in" - 18 "Out"- 12)	(Transfers "in" - 13 "Cut" - 10 )

## 1.D. B's Notes In R.G. R.F. Aumal Report.

Approval have; been growers for the appair ween to heef staff of an Inspector of Danger Buildings, himtholough C.G.F. Daviden D.S. T. T.C. (lase) Royal Artilling ancewed only on 27 June 1935:

The two Damer Build; Visions, who had bill then been unpareible in the efficient performance of their drafter to the Smin Inspection of Danger Build; Royal Branch, workill, as well as, in matins of unparen, so wee, were placed directly weather the new Inspection who, living on the sport, has been able so supervise are continate their activities so a far qualund orque and kenne salistactail. These could were been pareible more the some survey ween.

Monor I am able as mer so tral with upons some the James Beild; huspersia. Nat wishes of perhaps hav; so wais he the formitte will of an Officer from woodwill,

Oh 4 Januar 1936 D.-B.V. G. Wreighte which in attain; Her age of 65: He has rented for 49 years in Heir Factory. He was succeed by D.B.V. A. J. Wright an ex. Reg H. Sugt Hapon of Royal Arbillery. Ow; so the increased out had remained of the Factory Her hereby heir beind him her her wich as increased. To week their two adtivitional Daugh Anis To week their two adtivitional Daugh Anis Town have been apposited with effect from

#### Departmental Memo. No.

Minutes to be numbered consecutively.

· Sheet No.

To be left blank

Shall be glad to have your notes for my annual Report for 1935-36, Jan Sarly as fromble after Mr 31st march.

MM.

2. 3.3

Notes on the progress of books in the Building books Depe for 1935-36 cttacked fl.

Mar/20

#### Departmental Memo. No.

Minutes to be numbered consecutively.

Sheet No.

I shall be glad to have your notes for my Cannual Report for 1925-36, as Early as furnible after The 31st. March. Jo G. R. H. for. bor voted. Ad. 3/3/26. He to Su sorange. 10-2 Alls for bon the. He both Bu let me love your motes as Sept Horward notes from milion me.

be left blank

Minutes to be numbered consecutively.

Sheet No.

be left blank

for my annual Report for 1935-36, as Early as possible after 318 hard. will you let me have some general when of where . annual Report h/w. The figures for the amount of steam & electricity distributed & the cost has not yet been received. Spoke H. who will forward particulars early.

Copy of report for your retention 19 29/5/36

attached Supt: Forwarded. 9.6.6 7/6/36.

Sine Knopman.

Rifer Annual Riport you will

remember that Doff requires it in a certain

form which I ashered to last year.

It true glad if you could arrange for the

attached reports by he sorted out in this may,

M.S. & M.B. must be present to complete their

annual reports for inclusion. So you hink

Evous with some bechnical assistance. Time is

pressing and vering to the new

Herewith rangho of annual depost for 1935-36 as requested. Please seturn when done

